WATER POLLUTION ABATEMENT PLAN

For

Comal County ESD No. 3 Fire Station 54

In

8685 FM 306

New Braunfels, TX 78133

Prepared for:

Comal County Emergency Services District No. 3

P.O. Box 2140

Canyon Lake, Texas 78122

Prepared by:

Dawson Van Orden

825 Town & Country Lane, Suite 1150

Houston, Texas

(281) 293-7500

July 2019

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1. Edwards Aquifer Application Cover (TCEQ-20705)

Texas Commission on Environmental Quality

Edwards Aquifer Application Cover Page

Our Review of Your Application

The Edwards Aquifer Program staff conducts an administrative and technical review of all applications. The turnaround time for administrative review can be up to 30 days as outlined in 30 TAC 213.4(e). Generally administrative completeness is determined during the intake meeting or within a few days of receipt. The turnaround time for technical review of an administratively complete Edwards Aquifer application is 90 days as outlined in 30 TAC 213.4(e). Please know that the review and approval time is directly impacted by the quality and completeness of the initial application that is received. In order to conduct a timely review, it is imperative that the information provided in an Edwards Aquifer application include final plans, be accurate, complete, and in compliance with 30 TAC 213.

Administrative Review

1. Edwards Aquifer applications must be deemed administratively complete before a technical review can begin. To be considered administratively complete, the application must contain completed forms and attachments, provide the requested information, and meet all the site plan requirements. The submitted application and plan sheets should be final plans. Please submit one full-size set of plan sheets with the original application, and half-size sets with the additional copies.

   To ensure that all applicable documents are included in the application, the program has developed tools to guide you and web pages to provide all forms, checklists, and guidance. Please visit the below website for assistance: http://www.tceq.texas.gov/field/eapp.

2. This Edwards Aquifer Application Cover Page form (certified by the applicant or agent) must be included in the application and brought to the administrative review meeting.

3. Administrative reviews are scheduled with program staff who will conduct the review. Applicants or their authorized agent should call the appropriate regional office, according to the county in which the project is located, to schedule a review. The average meeting time is one hour.

4. In the meeting, the application is examined for administrative completeness. Deficiencies will be noted by staff and emailed or faxed to the applicant and authorized agent at the end of the meeting, or shortly after. Administrative deficiencies will cause the application to be deemed incomplete and returned.

   An appointment should be made to resubmit the application. The application is re-examined to ensure all deficiencies are resolved. The application will only be deemed administratively complete when all administrative deficiencies are addressed.

5. If an application is received by mail, courier service, or otherwise submitted without a review meeting, the administrative review will be conducted within 30 days. The applicant and agent will be contacted with the results of the administrative review. If the application is found to be administratively incomplete, it can be retrieved from the regional office or returned by regular mail. If returned by mail, the regional office may require arrangements for return shipping.

6. If the geologic assessment was completed before October 1, 2004 and the site contains “possibly sensitive” features, the assessment must be updated in accordance with the *Instructions to Geologists* (TCEQ-0585 Instructions).

Technical Review

1. When an application is deemed administratively complete, the technical review period begins. The regional office will distribute copies of the application to the identified affected city, county, and groundwater conservation district whose jurisdiction includes the subject site. These entities and the public have 30 days to provide comments on the application to the regional office. All comments received are reviewed by TCEQ.

2. A site assessment is usually conducted as part of the technical review, to evaluate the geologic assessment and observe existing site conditions. The site must be accessible to our staff. The site boundaries should be

clearly marked, features identified in the geologic assessment should be flagged, roadways marked and the alignment of the Sewage Collection System and manholes should be staked at the time the application is submitted. If the site is not marked the application may be returned.

3. We evaluate the application for technical completeness and contact the applicant and agent via Notice of Deficiency (NOD) to request additional information and identify technical deficiencies. There are two deficiency response periods available to the applicant. There are 14 days to resolve deficiencies noted in the first NOD. If a second NOD is issued, there is an additional 14 days to resolve deficiencies. If the response to the second notice is not received, is incomplete or inadequate, or provides new information that is incomplete or inadequate, the application must be withdrawn or will be denied. Please note that because the technical review is underway, whether the application is withdrawn or denied **the application fee will be forfeited**.

4. The program has 90 calendar days to complete the technical review of the application. If the application is technically adequate, such that it complies with the Edwards Aquifer rules, and is protective of the Edwards Aquifer during and after construction, an approval letter will be issued. Construction or other regulated activity may not begin until an approval is issued.

Mid-Review Modifications

It is important to have final site plans prior to beginning the permitting process with TCEQ to avoid delays.

Occasionally, circumstances arise where you may have significant design and/or site plan changes after your Edwards Aquifer application has been deemed administratively complete by TCEQ. This is considered a "Mid-Review Modification". Mid-Review Modifications may require redistribution of an application that includes the proposed modifications for public comment.

If you are proposing a Mid-Review Modification, two options are available:

- If the technical review has begun your application can be denied/withdrawn, your fees will be forfeited, and the plan will have to be resubmitted.
- TCEQ can continue the technical review of the application as it was submitted, and a modification application can be submitted at a later time.

If the application is denied/withdrawn, the resubmitted application will be subject to the administrative and technical review processes and will be treated as a new application. The application will be redistributed to the affected jurisdictions.

Please contact the regional office if you have questions. If your project is located in Williamson, Travis, or Hays County, contact TCEQ's Austin Regional Office at 512-339-2929. If your project is in Comal, Bexar, Medina, Uvalde, or Kinney County, contact TCEQ's San Antonio Regional Office at 210-490-3096

Please fill out all required fields below and submit with your application.

1. Regulated Entity Name: Comal County ESD No. 3 Fire Station 54						**2. Regulated Entity No.:** RN110810272			
3. Customer Name: Comal County Emergency Services District No. 3						**4. Customer No.:** CN605676402			
5. Project Type: **(Please circle/check one)**	New (circled)		Modification			Extension		Exception	
6. Plan Type: **(Please circle/check one)**	WPAP (circled)	CZP	SCS	UST	AST	EXP	EXT	Technical Clarification	Optional Enhanced Measures
7. Land Use: **(Please circle/check one)**	Residential		Non-residential (circled)			**8. Site (acres):**			5.01
9. Application Fee:	$5000		**10. Permanent BMP(s):**			Vegetative Filter Strips			
11. SCS (Linear Ft.):	N/A		**12. AST/UST (No. Tanks):**			N/A			
13. County:	Comal		**14. Watershed:**			Comal River-Guadalupe River			

Application Distribution

Instructions: Use the table below to determine the number of applications required. One original and one copy of the application, plus additional copies (as needed) for each affected incorporated city, county, and groundwater conservation district are required. Linear projects or large projects, which cross into multiple jurisdictions, can require additional copies. Refer to the "Texas Groundwater Conservation Districts within the EAPP Boundaries" map found at:

http://www.tceq.texas.gov/assets/public/compliance/field_ops/eapp/EAPP%20GWCD%20map.pdf

For more detailed boundaries, please contact the conservation district directly.

Austin Region			
County:	**Hays**	**Travis**	**Williamson**
Original (1 req.)	__	__	__
Region (1 req.)	__	__	__
County(ies)	__	__	__
Groundwater Conservation District(s)	__Edwards Aquifer Authority __Barton Springs/ Edwards Aquifer __Hays Trinity __Plum Creek	__Barton Springs/ Edwards Aquifer	NA
City(ies) Jurisdiction	__Austin __Buda __Dripping Springs __Kyle __Mountain City __San Marcos __Wimberley __Woodcreek	__Austin __Bee Cave __Pflugerville __Rollingwood __Round Rock __Sunset Valley __West Lake Hills	__Austin __Cedar Park __Florence __Georgetown __Jerrell __Leander __Liberty Hill __Pflugerville __Round Rock

San Antonio Region					
County:	**Bexar**	**Comal**	**Kinney**	**Medina**	**Uvalde**
Original (1 req.)	__	1	__	__	__
Region (1 req.)	__	1	__	__	__
County(ies)	__	1	__	__	__
Groundwater Conservation District(s)	__ Edwards Aquifer Authority __Trinity-Glen Rose	1 Edwards Aquifer Authority	__Kinney	__EAA __Medina	__EAA __Uvalde
City(ies) Jurisdiction	__Castle Hills __Fair Oaks Ranch __Helotes __Hill Country Village __Hollywood Park __San Antonio (SAWS) __Shavano Park	__Bulverde __Fair Oaks Ranch __Garden Ridge 1 New Braunfels __Schertz	NA	__San Antonio ETJ (SAWS)	NA

I certify that to the best of my knowledge, that the application is complete and accurate. This application is hereby submitted to TCEQ for administrative review and technical review.
Alan Stahlman
Print Name of Customer/Authorized Agent
Signature of Customer/Authorized Agent — Date: 6-17-2019

FOR TCEQ INTERNAL USE ONLY				
Date(s)Reviewed:		Date Administratively Complete:		
Received From:		Correct Number of Copies:		
Received By:		Distribution Date:		
EAPP File Number:		Complex:		
Admin. Review(s) (No.):		No. AR Rounds:		
Delinquent Fees (Y/N):		Review Time Spent:		
Lat./Long. Verified:		SOS Customer Verification:		
Agent Authorization Complete/Notarized (Y/N):		Fee Check:	Payable to TCEQ (Y/N):	
Core Data Form Complete (Y/N):			Signed (Y/N):	
Core Data Form Incomplete Nos.:			Less than 90 days old (Y/N):	

2. General Information Form (TCEQ-0587)

General Information Form

Texas Commission on Environmental Quality

For Regulated Activities on the Edwards Aquifer Recharge and Transition Zones and Relating to 30 TAC §213.4(b) & §213.5(b)(2)(A), (B) Effective June 1, 1999

To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.

Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.

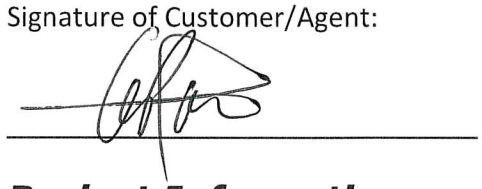
Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **General Information Form** is hereby submitted for TCEQ review. The application was prepared by:

Print Name of Customer/Agent: Carlos Pacas

Date: 07/16/19

Signature of Customer/Agent:



Project Information

1. Regulated Entity Name: Comal County ESD No.3 Fire Station 54
2. County: Comal
3. Stream Basin: Comal River - Guadalupe River
4. Groundwater Conservation District (If applicable): Edwards Aquifer Authority
5. Edwards Aquifer Zone:

   [X] Recharge Zone
   [ ] Transition Zone

6. Plan Type:

   [X] WPAP
   [ ] SCS
   [ ] Modification
   [ ] AST
   [ ] UST
   [ ] Exception Request

7. Customer (Applicant):

Contact Person: Angela Hemphill
Entity: Comal County ESD No.3
Mailing Address: PO Box 2140
City, State: Canyon Lake, TX Zip: 78133
Telephone: (830) 907-2922 FAX: N/A
Email Address: angela.hemphill@ccesd3.org

8. Agent/Representative (If any):

Contact Person: Carlos Pacas
Entity: Dawson Van Orden, Inc (DVO)
Mailing Address: 825 Town & Country Lane, Suite 1150
City, State: Houston, TX Zip: 77024
Telephone: (281) 293-7500 FAX: N/A
Email Address: cpacas@dvoeng.com

9. Project Location:

☐ The project site is located inside the city limits of _____.
☐ The project site is located outside the city limits but inside the ETJ (extra-territorial jurisdiction) of _____.
☒ The project site is not located within any city's limits or ETJ.

10. ☒ The location of the project site is described below. The description provides sufficient detail and clarity so that the TCEQ's Regional staff can easily locate the project and site boundaries for a field investigation.
Project site is located at 8685 FM 306, New Braunfels, TX 78132, 0.4 miles south of Purgatory Rd. and 8.6 miles north of IH-35 in Comal County.

11. ☒ **Attachment A – Road Map**. A road map showing directions to and the location of the project site is attached. The project location and site boundaries are clearly shown on the map.

12. ☒ **Attachment B - USGS / Edwards Recharge Zone Map**. A copy of the official 7 ½ minute USGS Quadrangle Map (Scale: 1" = 2000') of the Edwards Recharge Zone is attached. The map(s) clearly show:

☒ Project site boundaries.
☒ USGS Quadrangle Name(s).
☒ Boundaries of the Recharge Zone (and Transition Zone, if applicable).
☒ Drainage path from the project site to the boundary of the Recharge Zone.

13. ☒ **The TCEQ must be able to inspect the project site or the application will be returned**. Sufficient survey staking is provided on the project to allow TCEQ regional staff to locate the boundaries and alignment of the regulated activities and the geologic or manmade features noted in the Geologic Assessment.

☒ Survey staking will be completed by this date: 7/31/19

14. [X] **Attachment C – Project Description**. Attached at the end of this form is a detailed narrative description of the proposed project. The project description is consistent throughout the application and contains, at a minimum, the following details:

- [X] Area of the site
- [X] Offsite areas
- [X] Impervious cover
- [X] Permanent BMP(s)
- [X] Proposed site use
- [X] Site history
- [X] Previous development
- [X] Area(s) to be demolished

15. Existing project site conditions are noted below:

- [ ] Existing commercial site
- [ ] Existing industrial site
- [ ] Existing residential site
- [ ] Existing paved and/or unpaved roads
- [X] Undeveloped (Cleared)
- [ ] Undeveloped (Undisturbed/Uncleared)
- [ ] Other: _____

Prohibited Activities

16. [X] I am aware that the following activities are prohibited on the Recharge Zone and are not proposed for this project:

(1) Waste disposal wells regulated under 30 TAC Chapter 331 of this title (relating to Underground Injection Control);

(2) New feedlot/concentrated animal feeding operations, as defined in 30 TAC §213.3;

(3) Land disposal of Class I wastes, as defined in 30 TAC §335.1;

(4) The use of sewage holding tanks as parts of organized collection systems; and

(5) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41(b), (c), and (d) of this title (relating to Types of Municipal Solid Waste Facilities).

(6) New municipal and industrial wastewater discharges into or adjacent to water in the state that would create additional pollutant loading.

17. [X] I am aware that the following activities are prohibited on the Transition Zone and are not proposed for this project:

(1) Waste disposal wells regulated under 30 TAC Chapter 331 (relating to Underground Injection Control);

(2) Land disposal of Class I wastes, as defined in 30 TAC §335.1; and

(3) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41 (b), (c), and (d) of this title.

Administrative Information

18. The fee for the plan(s) is based on:

- [X] For a Water Pollution Abatement Plan or Modification, the total acreage of the site where regulated activities will occur.
- [ ] For an Organized Sewage Collection System Plan or Modification, the total linear footage of all collection system lines.
- [ ] For a UST Facility Plan or Modification or an AST Facility Plan or Modification, the total number of tanks or piping systems.
- [ ] A request for an exception to any substantive portion of the regulations related to the protection of water quality.
- [ ] A request for an extension to a previously approved plan.

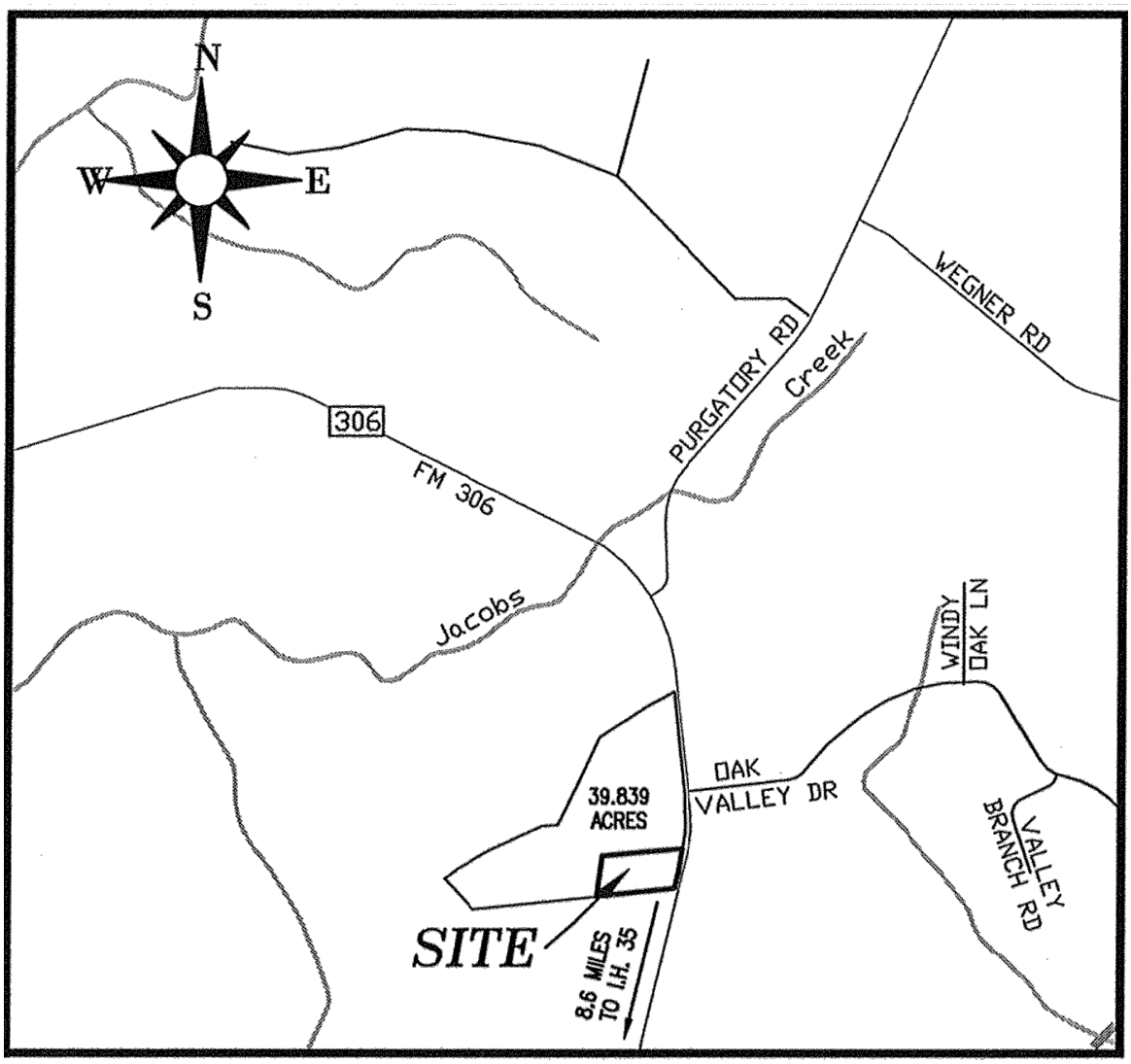
19. [X] Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:

- [ ] TCEQ cashier
- [ ] Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
- [X] San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)

20. [X] Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

21. [X] No person shall commence any regulated activity until the Edwards Aquifer Protection Plan(s) for the activity has been filed with and approved by the Executive Director.

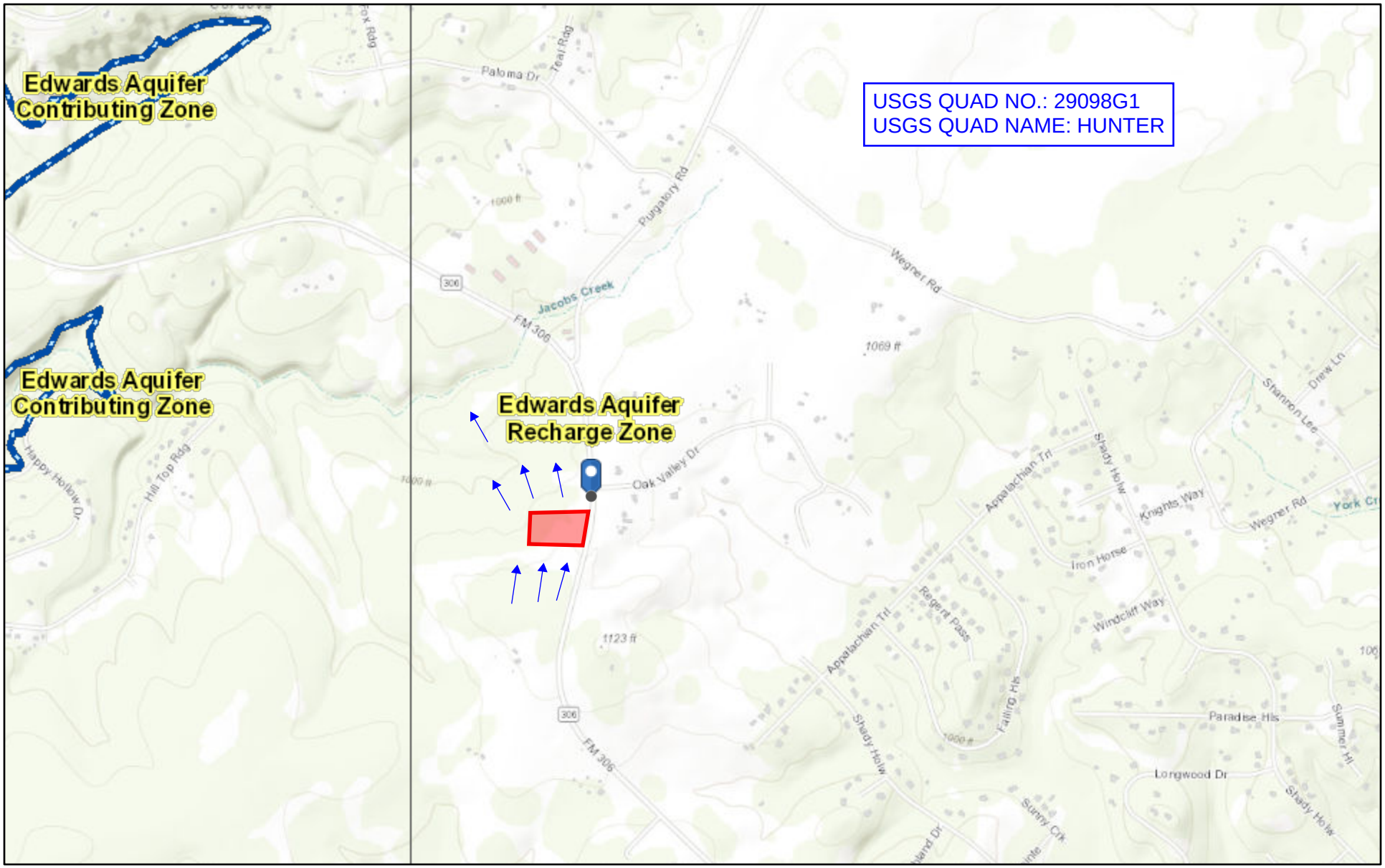
Attachment A – Road Map



LOCATION MAP
SCALE: 1"=1000'

Attachment B – USGS / Edwards Recharge Zone Map

Comal Co. FS 54 USGS/Edwards Recharge Zone Map



6/13/2019, 10:53:17 AM

Segments (Reservoirs)
SWQM Stations (Active)
Edwards Aquifer Boundary
Segments (Streams)
Edwards Aquifer Label
Edwards Aquifer Boundary central line
Project Site Boundaries
Drainage Pattern

1:24,000

0 500 1,000 2,000 ft

0 285 570 1,140 m

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS,

Web AppBuilder for ArcGIS

City of Austin, Comal County, Texas Parks & Wildlife, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA | TCEQ |

Attachment C - Project Description

Area of the Site

The 5.01-acre site is in Comal County, located at 8685 FM 306, New Braunfels, Texas, 78132. The project site is currently undeveloped and uncleared. There are 114 existing trees on the property. There are no existing utilities on-site. The scope of the project includes concrete paving, septic system, water well, 6" fire line, 2" domestic line, ditch regrading, driveway, 24" driveway culvert, and reconstruction of existing vegetative strips on the ditch along FM 306 as part of TxDOT's WPAP agreement with TCEQ

Offsite Areas

Existing sheet flow runs south to north across the entire property, with an approximate slope of 5%. The areas to the north, south, and west are currently undeveloped and undisturbed. There are a few existing homes east of the project site on the opposite side of FM 306. FM 306 (variable ROW width) runs along the east side of the site.

Impervious Cover

The impervious cover for the proposed development is 0.802 acres, which is 16% out of the total 5.01-acre site. The proposed impervious cover includes concrete parking, sidewalk, and the fire station building.

Temporary BMP(s)

The temporary BMPs that will be utilized on-site during construction are reinforced filter fabric barrier, filter fabric fence, filter dam, and stabilized construction access. The application of these BMPs will prevent and filter sedimentation caused by construction activity from draining towards upstream properties.

Permanent BPM(s)

The permanent BMP that will be utilized on-site are vegetative filter strips. These filter strips remove pollutants by filtration by vegetation and infiltration. Vegetative filter strips will be installed on-site along the perimeter of the project site to treat on-site and off-site flows. The catchment area will have sheet flow to the filter strips without the use of a level spreader and treat low peak runoff flows. Vegetative filter strips will also be reconstructed along the existing roadside ditch on FM 306 (TxDOT right-of-way) where the shoulder will be widened.

Proposed Site Use

The development consists of a proposed 6,245 square-foot fire station that will serve the Comal County area.

Site History

The current owner of the site is Comal County Emergency Services District No. 3. The current owner purchased the property from Yvonne Pantermuehl on May 9, 2017. The site has remained undeveloped.

Previous Development

Per Google Earth, the site has been undeveloped since 1995. There have been no previous developments on this site.

Area(s) to be Demolished

Approximately one (1) acre of the site will be cleared in order to make room for the proposed development. The existing trees will be preserved in the project site.

3. Geologic Assessment (TCEQ-0585)

Geologic Assessment

Texas Commission on Environmental Quality

For Regulated Activities on The Edwards Aquifer Recharge/transition Zones and Relating to 30 TAC §213.5(b)(3), Effective June 1, 1999

To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.

Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.

Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Print Name of Geologist: Richard V. Klar, P.G. Telephone: 210-699-9090

Date: June 21, 2019 Fax: 210-699-6426

Representing: Raba Kistner Environmental, Inc., TBPG #50220 / TBPE Firm #3257 for Dawson Van Orden, Inc. (Name of Company and TBPG or TBPE registration number)

Signature of Geologist:

Regulated Entity Name: Comal County ESD #3 Fire Station No. 54

Project Information

1. Date(s) of Geologic Assessment was performed: June 12, 2019
2. Type of Project:

☒ WPAP ☐ AST
☐ SCS ☐ UST

3. Location of Project:

   ☒ Recharge Zone
   ☐ Transition Zone
   ☐ Contributing Zone within the Transition Zone

4. ☒ **Attachment A – Geologic Assessment Table**. Completed Geologic Assessment Table (Form TCEQ-0585-Table) is attached.

5. ☒ Soil cover on the project site is summarized in the table below and uses the SCS Hydrologic Soil Groups* (Urban Hydrology for Small Watersheds, Technical Release No. 55, Appendix A, Soil Conservation Service, 1986). If there is more than one soil type on the project site, show each soil type on the site Geologic Map or a separate soils map.

Table 1 - Soil Units, Infiltration Characteristics and Thickness

Soil Name	Group*	Thickness
Rumple-Comfort association, undulating (RUD)	C	0 to 3.0 feet

**Soil Group Definitions (Abbreviated)*

A. Soils having a high infiltration rate When thoroughly wetted.
B. Soils having a moderate infiltration rate when thoroughly wetted.
C. Soils having a slow infiltration rate when thoroughly wetted.
D. Soils having a very slow infiltration rate when thoroughly wetted.

6. ☒ **Attachment B – Stratigraphic Column**. A stratigraphic column showing formations, members, and thickness is attached. The outcropping unit, if present, should be at the top of the stratigraphic column. Otherwise, the uppermost unit should be at the top of the stratigraphic column.

7. ☒ **Attachment C – Site Geology**. A narrative description of the site specific geology including any features identified in the Geologic Assessment Table, a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure(s), and karst characteristics is attached.

8. ☒ **Attachment D – Site Geologic Map(s).** The Site Geologic Map must be the same scale as the applicant's Site Plan. The minimum scale is 1":400'.

   Applicant's Site Plan Scale: 1" = 30'
   Site Geologic Map Scale: 1" = 30'
   Site Soils Map Scale (if more than 1 soil type): See ***Site Geologic Map***

9. Method of collecting positional data:

   ☒ Global Positioning System (GPS) technology.
   ☐ Other method(s). Please describe method of data collection: ___

10. ☒ The project site boundaries are clearly shown and labeled on the Site Geologic Map.

11. ☒ Surface geologic units are shown and labeled on the Site Geologic Map.

12. ☒ Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.

    ☐ Geologic or manmade features were not discovered on the project site during the field investigation.

13. ☒ The Recharge Zone boundary is shown and labeled, if appropriate.

14. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.): If applicable, the information must agree with Item No. 20 of the WPAP Application Section.
    ☒ There are 6 (#) test holes present on the project site and the locations are shown and labeled. (Check all of the following that apply.)
    ☒ The test holes are not in use and have been properly abandoned.
    ☐ The well is not in use and will be properly abandoned.
    ☐ The well is not in use and complies with 16 TAC Chapter 76.
    ☐ There are no wells or test holes of any kind known to exist on the project site.

Administrative Information

☒ Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

ATTACHMENTS

ATTACHMENT A

GEOLOGIC ASSESSMENT TABLE (TCEQ-0585-TABLE)

COMMENTS TO GEOLOGIC ASSESSMENT TABLE

SOIL PROFILE

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: ***Comal County ESD #3 Fire Station 54 - Canyon Lake, Comal County, Texas***
*(**RKEI** Project No. ASF19-071-00)*

LOCATION			FEATURE CHARACTERISTICS											EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11	12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)	TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6	>1.6	
S-1	N29 50 26.9	W98 07 08.0	MB (TH)	30	Kek	0.3		23.5					X	6	36	✓		✓		Hilltop
S-2	N29 50 27.6	W98 07 08.0	MB (TH)	30	Kek	0.3		23.5					X	6	36	✓		✓		Hilltop
S-3	N29 50 28.0	W98 07 08.0	MB (TH)	30	Kek	0.3		23.5					X	6	36	✓		✓		Hilltop
S-4	N29 50 27.2	W98 07 09.5	MB (TH)	30	Kek	0.3		3.5					X	6	36	✓		✓		Hilltop
S-5	N29 50 26.1	W98 07 08.0	MB (TH)	30	Kek	0.3		3.7					X	6	36	✓		✓		Hilltop
S-6	N29 50 27.6	W98 07 07.0	MB (TH)	30	Kek	0.3		5.0					X	6	36	✓		✓		Hilltop

*** DATUM:** ***NAD 83***

Feature: TH = geotechnical test hole, plugged
Formation: Kek = Kainer Formation

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials: ***Test holes plugged to ground surface with site-derived (clay) soil cuttings.***

12 TOPOGRAPHY
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

I have read, I understood, and I have followed the Texas Natural Resource Conservation Commission's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field.
My signature certifies that I am qualified as a geologist as defined by 30 TAC 213.

STATE OF TEXAS
RICHARD V. KLAR
GEOLOGY
259
LICENSED
PROFESSIONAL GEOSCIENTIST

Date: ***6/21/19***

Sheet 1 of 1

TCEQ-0585-Table (Rev. 10-01-04)

COMMENTS TO GEOLOGIC ASSESSMENT TABLE
Comal County ESD #3 Fire Station No. 54
Canyon Lake, Comal County, Texas

The locations of the following features are indicated on the ***Site Geologic Map*** provided as Attachment D of this report.

Manmade Features

Features S-1 through S-6 (MB):

Features S-1 through S-6 consists of test holes drilled by Terracon Consultants, Inc. on October 5, 2018 for a geotechnical engineering study. The borings were installed to evaluate soil conditions within the building footprint and pavement area for the proposed fire station development. These test holes were reportedly installed to depths on the order of 3.5-23.5 feet below ground surface. Based on our interpretation of the boring log data, borings B-1 through B-6 were terminated in the Kainer Formation. Based on our observations in conjunction with field reconnaissance activities, the test holes were effectively plugged and abandoned following the completion of drilling activities using site-derived (clay) soil cuttings. These test hole features are no longer existing, and therefore collectively classified as not sensitive.

SOIL PROFILE
Comal County ESD #3 Fire Station No. 54
Canyon Lake, Comal County, Texas

SOIL SERIES	THICKNESS ON SITE	DESCRIPTION
Rumple-Comfort	**0 to 3.0 feet**	***Rumple-Comfort-association, undulating (RUD):*** Rumple soils make up about 60% of this association and are on broad ridge tops and side slopes. The surface layer is dark reddish brown very cherty clay loam about 10 inches thick with rounded chert limestone cobbles and gravel cover about 20% of the surface. The subsoil is dark reddish brown very cherty clay to approximate depth of 14 inches and dark reddish brown extremely stony clay to a depth of about 28 inches. The surface layer of the Comfort soil is dark brown, neutral, extremely stony clay about 7 inches thick. The subsoil is dark reddish brown, mildly alkaline, extremely stony clay to a depth of 12 inches. The underlying material for both Rumple and Comfort soils is indurated fractured limestone.

The preceding table was prepared on the basis of information provided in the *Soils Survey of Comal and Hays Counties, Texas (June 1984)* in addition to field observations and geotechnical drilling data prepared by Terracon Consultants, Inc. (2018). As presented on the attached ***Site Geologic Map***, native soils mapped for the entire subject property are classified as Rumple-Comfort association, undulating (RUD). Rumple soils have a higher permeability than Comfort soils (0.2-0.6 inches/hour versus 0.06-0.2 inches/hour, respectively), which accounts for its Soil Group classification of "C" versus "D". The RUD soil is weakly-developed and relatively thin, occurring over weathered limestone unit of the Kainer Formation (Kek) and reported as having low to moderate shrink-swell potential. RUD soils are noted to have medium runoff and moderate hazard for erosion. Although these soils have a slow infiltration rate when the soils are wet, the infiltration can be rapid when the soils are dry.

ATTACHMENT B

STRATIGRAPHIC COLUMN

STRATIGRAPHIC COLUMN
Comal County ESD #3 Fire Station 54
Canyon Lake, Comal County, Texas

STRATIGRAPHIC FORMATION	THICKNESS	DESCRIPTION
Kainer Formation (Kek)	260-310 feet	
Kirschberg Evaporate Member (Kkke)	50–60 feet	Highly altered crystalline limestone; chalky mudstone and nodular chert. Field indications found in caves and erosional environments include boxwork voids with neospar and travertine frames, coinciding with increased probability of extensive cave development. Within the Kainer Formation, hydrogeologic subdivision VI (Kkke) appears to be the most porous and permeable subdivision. ***Patchy exposures in the northwest SITE corner.***
Dolomitic Member (Kkd)	110–130 feet	Mudstone to grainstone; crystalline limestone and chert nodules. Field identification by massively bedded light gray, *Toucasia* abundant. Cavern development is related to structure and bedding planes. Hydrogeologic subdivision VII (dolomitic member) generally is porous and relatively permeable. ***Not exposed at the SITE.***
Basal Nodular Member (Kkbn)	50-60 feet	Shaly, nodular limestone; mudstone and *miliolid* grainstone. Large lateral caves at surface; fabric/large conduit flow at surface with no permeability in subsurface. ***Not exposed at the SITE.***

Note: Stratigraphic Column adapted from Small and Hanson (1994).

ATTACHMENT C

NARRATIVE OF SITE SPECIFIC GEOLOGY

SITE GEOLOGY NARRATIVE
Comal County ESD #3 Fire Station 54
Canyon Lake, Comal County, Texas

Introduction

The following is a site-specific discussion of existing geological conditions and potential recharge features identified within the referenced project site. This assessment was performed by **Raba Kistner Environmental, Inc. (RKEI)** for Dawson Van Orden, Inc. (CLIENT), pursuant to applicable Edwards Aquifer Protection Program (EAPP) Rules as specified in *Title 30 of the Texas Administrative Code, Section 213 (30 TAC §213, effective April 24, 2008).* This assessment report is in the format required by the Texas Commission on Environmental Quality (TCEQ) for the Geologic Assessment and was prepared in accordance with the revised *Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones (TCEQ-0585)*, which are applicable to submittals received by the TCEQ after October 1, 2004.

This geologic assessment report documents conditions observed by **RKEI** within the project boundaries on June 12, 2019.

Project Description and Background

Site Location. The subject property comprises an approximately 5.01-acre tract of undeveloped land located southeast of Canyon Lake along F.M. 306 in Comal County, Texas (i.e., hereinafter referred to as SITE). The SITE will host fire station building with associated parking and driveway areas. Based on review of official maps published by the Texas Commission on Environmental Quality (TCEQ), the entire SITE is located within the Edwards Aquifer Recharge Zone (EARZ). Given the project's location within the EARZ, performance of a geologic assessment is required to facilitate planned construction activities pursuant to applicable Edwards Aquifer Protection Program (EAPP) rules.

Topography and Drainage. Topographic contours on the U.S. Geological Survey (USGS, 2013) 7.5-minute topographic map (i.e., Sattler Quadrangle) were reviewed to evaluate the general surface conditions and drainage patterns, along with more detailed 5-foot topographic contours obtained from the Comal County GIS website (i.e., *http://data2-comalcounty.opendata.arcgis.com/datasets/contour5ft-open-data*, dated 2017). The SITE consists of a gently sloping hilltop topography, exhibiting a maximum elevation along the south boundary of approximately 1,085 feet relative to mean sea level (msl) and slopes to a minimum elevation of approximately 1,055 feet at the northwest corner of the SITE. As indicated by topographic contours presented on the ***Site Geologic Map***, surface drainage patterns for the SITE are generally toward the north and northwest. There were no defined drainage features identified at the SITE.

A review of Flood Insurance Rate Map (FIRM 48091C0280F, FEMA, September 2, 2009) indicates that SITE is fully contained within Zone X (i.e., an area determined to be outside of the defined 0.2% annual probability floodplain area) as designated on official maps.

Historical Property Use. Although research pertaining to past SITE operations and historical land use activities was beyond the scope of this assessment, historical aerial imagery was reviewed to evaluate

historical land use and the presence of lineations that could indicate the presence of normal faulting. The following aerial photographs from Google Earth™ were reviewed: 2002, 2008, 2010, 2012, 2014, 2016, and 2018. The aerial images from 2002 to 2018 indicate that the SITE was undeveloped as part of a larger ranch property. The SITE conditions appear essentially unchanged with negligible differences in vegetation in comparison with previous aerial imagery. As presented on the attached ***Site Geologic Map,*** current adjacent properties include vacant land to the north, west, and south, and residential and vacant land to the east.

Classification of Recharge Features: As further described herein, no naturally-occurring features attributing to karstification of limestone terrain and/or erosional processed were identified within SITE boundaries. Features identified and discussed below include six manmade features (i.e., test holes). The significance of these features was assessed using definitions and guidance provided in *Instructions to Geologists (TCEQ-0585-Instructions, revised October 1, 2004)*. All features within the SITE that met the criteria presented in this reference were mapped. The characteristics of all mapped features and the assessments of these features, as defined by the TCEQ, are presented in the attached ***Geologic Assessment Table (TCEQ-0585)***.

Stratigraphy

As presented in the attached ***Stratigraphic Column***, information pertaining to the lithology of the geologic units underlying the SITE was taken from Small and Hanson (1994). The published geologic references indicate that the SITE is underlain by the Kainer Formation, which comprises the lower formation of the Edwards Limestone. Members that make up the Kainer Formation from youngest to oldest are as follows: (i) Grainstone member, (ii) the Kirschberg evaporite member (Kkke), (Iii) the Dolomitic member (Kkd), and (iv) the Basal nodular member (Kkbn).

- Grainstone member (Kkg) is the uppermost member of the Kainer Formation, consisting of dense, tightly cemented miliolid grainstone, with scattered patches of mudstone and wackestone throughout. Chert nodules are present but rare and *Toucasias* are common near the top of the member. Kkg has a maximum thickness of 60 feet. This unit was not observed at the SITE.
- Kirschberg evaporite member (Kkke) consists of highly altered crystalline limestone, chalky mudstone, containing chert nodules with a maximum thickness of 60 feet. Cave development includes boxwork voids with neospar and travertine frames.
- The Dolomitic member (Kkd) is a mudstone to grainstone crystalline limestone with chert nodules. This member has a maximum thickness of 130 feet, is massively bedded, light gray, and abundant in *Toucasia*. Caves within this member are related to structure or bedding planes.
- The underlying Basal nodular member (Kkbn) is a shaly, nodular limestone which consists of massive mudstone to grainstone limestone. This member is noted for large lateral caves at the surface.

Based on field observations and interpretation of published geologic information, surface geology at the SITE is inferred to correspond to the Kirschberg Evaporite member. Due to the lower elevation in the northwest corner, erosional processes have exposed patches of limestone bedrock correlating to the Kkke.

Structure

This PROJECT is located within the Balcones Fault Zone and as such possesses a distinct structural trend. This zone generally consists of a northeast-southwest trending, *en echelon* normal fault system, which juxtaposes Upper Cretaceous lithologies in the southeast with Lower Cretaceous lithologies in the northwest. As a result of this larger-scale, regional faulting, minor internal fault sequences and fractures exist within this zone which follow the same structural trend and accommodate localized displacement.

Based on review of historical aerial photographs, published maps, and in conjunction with field mapping efforts, no indications of lineations that could be associated with normal faulting were identified within the SITE boundaries.

Karst Features

Although patchy exposures of limestone bedrock were identified within the northwest portion of the assessment area, results of field mapping activities did not reveal the presence of any features within SITE boundaries that could be attributed to karstification of the underlying limestone terrain.

Non-Karst Closed Depression

The results of field mapping activities did not reveal any non-karst closed depressions within the SITE limits.

Manmade Features

Features S-1 through S-6 are geotechnical soil borings installed by Terracon Consultants, Inc. (Terracon) on October 4, 2018 to evaluate engineering characteristics as necessary to develop structural and pavement recommendations. The borings were reportedly drilled to depths on the order of 3.5 to 23.5 feet and plugged with site-derived (clay) soil cuttings upon completion of drilling activities. These features are no longer existing, and therefore classified as not sensitive. The former locations of these features were obtained from the Terracon (2018) report and are included on the ***Site Geologic Map***.

Potential for Fluid Migration to the Edwards Aquifer

Based on a review of SITE geology, topography and drainage conditions, and the results of our mapping efforts, the overall potential for fluid movement (i.e., surface-derived flow) to the Edwards Aquifer via infiltration is considered to be low. The following assessment findings support this conclusion:

- Given the relatively thin layer of clay surface cover and the fact that the SITE is directly underlain by the Kainer Formation, the potential for direct infiltration is considered to be low.

- No well-defined drainage channels exist on SITE that would serve to concentrate or focus recharge into the subsurface.

- No sensitive features attributed to karstification of limestone terrain were identified throughout SITE boundaries.

References

Barnes, V. L., 1983, Geologic Atlas of Texas San Antonio Sheet; Bureau of Economic Geology, The University of Texas at Austin, Austin, Texas.

Comal County GIS website, http://data2-comalcounty.opendata.arcgis.com/datasets/contour5ft-open-data, dated December 12, 2017, accessed June 14, 2019.

National Flood Insurance Program, 2009, Flood Insurance Rate Map, Comal County, Texas and Incorporated Areas; Federal Emergency Management Agency, Map 48091C0435F.

Small, Ted A., and John A. Hanson, 1994, Geologic framework and hydrogeologic characteristics of the Edwards Aquifer outcrop, Comal County, Texas: U.S. Geological Survey Water Resources Investigations Report 94-4117.

TCEQ Edwards Aquifer Protection Program, 1998, Edwards Aquifer Recharge Zone Map, Hunter Quadrangle; TNRCC, September 1998.

Terracon Consultants, Inc., 2018, Geotechnical Engineering Report, dated December 22, 2018, provided to **RKEI** via email correspondence from Dawson Van Orden, Inc. on June 10, 2019.

United States Geological Survey (USGS), 2013, Hunter and Sattler Quadrangles; USGS, Denver, Colorado.

United States Geological Survey (USGS), 2005, Geologic Map of the Edwards Aquifer Recharge Zone, South-Central, Texas.

United States Department of Agriculture (USDA), 1984, Soil Survey of Comal and Hays Counties, Texas; USDA / Soil Conservation Service / Texas Agricultural Experiment Station.

United States Department of Agriculture (USDA), 1986, Urban Hydrology for Small Watersheds; USDA / Natural Resource Conservation Service, Technical Release (TR-) 55, June 1986.

ATTACHMENT D

SITE GEOLOGIC MAP

FEATURE POSITION TABLE
(GPS COORDINATES)

Sources:

1. Project limits digitized from the Comal County GIS map, June 2019.
2. Orthoimagery obtained from Google Earth Pro, November 2018.
3. Boring locations taken from the Geotechnical Engineering Report prepared by Terracon Consultants, Inc., dated October 22, 2018, provided by Dawson Van Orden, Inc. on June 10, 2019.
4. Contours downloaded from Comal County GIS website http://data2-comalcounty.opendata.arcgis.com/datasets/contour5ft-open-data, dated December 12, 2017.
5. Geology adapted from Small and Hanson, Geologic Framework and Hydrogeologic Characteristics of the Edwards Aquifer Outcrop, Comal County, 1994.
6. Soils data provided by Natural Resources Conservation Service (NRCS) - 2004.

NOTE: This Drawing is Provided for Illustration Only, May Not be to Scale and is Not Suitable for Design or Construction Purposes

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6/21/19

STATE OF TEXAS
RICHARD V. KLAR
GEOLOGY
259
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PROFESSIONAL GEOSCIENTIST

SITE GEOLOGIC MAP

COMAL COUNTY ESD #3 FIRE STATION 54
CANYON LAKE, COMAL COUNTY, TEXAS

REVISIONS:

No.	DATE	DESCRIPTION

PROJECT No.: ASF19-071-00

ISSUE DATE:	06-21-19
DRAWN BY:	LAW
CHECKED BY:	CRM
REVIEWED BY:	RVK

N W E S

0 7.5 15 30 FEET

1 INCH = 30 FEET

FEATURE POSITION TABLE

Comal County ESD #3 Fire Station 54

Canyon Lake, Comal County, Texas

RKEI Project No. ASF19-071-00

Feature Designation	Feature Type	Date Collected	North Latitude	West Longitude	UTM Northing (meters)	UTM Easting (meters)
S-1	Manmade feature in bedrock (Plugged Geotechnical Test Hole)	6/12/2019	N29 50 26.9	W98 07 08.0	3301471	585117
S-2	Manmade feature in bedrock (Plugged Geotechnical Test Hole)	6/12/2019	N29 50 27.6	W98 07 08.0	3301493	585117
S-3	Manmade feature in bedrock (Plugged Geotechnical Test Hole)	6/12/2019	N29 50 28.0	W98 07 08.0	3301504	585117
S-4	Manmade feature in bedrock (Plugged Geotechnical Test Hole)	6/12/2019	N29 50 27.2	W98 07 09.5	3301481	585078
S-5	Manmade feature in bedrock (Plugged Geotechnical Test Hole)	6/12/2019	N29 50 26.1	W98 07 08.0	3301448	585117
S-6	Manmade feature in bedrock (Plugged Geotechnical Test Hole)	6/12/2019	N29 50 27.6	W98 07 07.0	3301493	585146

NOTES:

1) Geographic coordinates are presented Degrees, Minutes, Decimal Seconds
2) Reference Datum is NAD 83.
3) Data were collected utilizing a ***Garmin GPS 60cx Global Positioning System*** .
4) Horizontal Accuracy: RMS Value < 3 meter ground resolution.
5) GPS coordinates were taken from the Geotechnical Engineering Report prepared by Terracon Consultants, Inc report dated October 22, 2018, project number 90185283.
6) GPS coordinates correlate to the points on the map for each feature.

4. Water Pollution Abatement Plan Application

(TCEQ-0584)

Water Pollution Abatement Plan Application

Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(b), Effective June 1, 1999

To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.

Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.

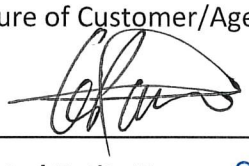
Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Water Pollution Abatement Plan Application Form** is hereby submitted for TCEQ review and Executive Director approval. The form was prepared by:

Print Name of Customer/Agent: Carlos Pacas

Date: 07/16/19

Signature of Customer/Agent:



Regulated Entity Name: Comal County ESD No. 3 Fire Station 54

Regulated Entity Information

1. The type of project is:

   ☐ Residential: Number of Lots:_____
   ☐ Residential: Number of Living Unit Equivalents:_____
   ☒ Commercial
   ☐ Industrial
   ☐ Other:_____

2. Total site acreage (size of property): 5.01

3. Estimated projected population: 5

4. The amount and type of impervious cover expected after construction are shown below:

Table 1 - Impervious Cover Table

Impervious Cover of Proposed Project	Sq. Ft.	Sq. Ft./Acre	Acres
Structures/Rooftops	7,718	÷ 43,560 =	0.177
Parking	22,671	÷ 43,560 =	0.520
Other paved surfaces	1,937	÷ 43,560 =	0.045
Total Impervious Cover	32,326	÷ 43,560 =	0.742

Total Impervious Cover 0.742 **÷ Total Acreage** 5.01 **X 100 =** 14.8 **% Impervious Cover**

5. [X] **Attachment A - Factors Affecting Surface Water Quality**. A detailed description of all factors that could affect surface water and groundwater quality that addresses ultimate land use is attached.

6. [X] Only inert materials as defined by 30 TAC §330.2 will be used as fill material.

For Road Projects Only

Complete questions 7 - 12 if this application is exclusively for a road project.

7. Type of project:

   [ ] TXDOT road project.
   [ ] County road or roads built to county specifications.
   [ ] City thoroughfare or roads to be dedicated to a municipality.
   [ ] Street or road providing access to private driveways.

8. Type of pavement or road surface to be used:

   [ ] Concrete
   [ ] Asphaltic concrete pavement
   [ ] Other: _____

9. Length of Right of Way (R.O.W.): _____ feet.

   Width of R.O.W.: _____ feet.
   L x W = _____ Ft^2 ÷ 43,560 Ft^2/Acre = _____ acres.

10. Length of pavement area: _____ feet.

    Width of pavement area: _____ feet.
    L x W = _____ Ft^2 ÷ 43,560 Ft^2/Acre = _____ acres.
    Pavement area _____ acres ÷ R.O.W. area _____ acres x 100 = _____% impervious cover.

11. [ ] A rest stop will be included in this project.

    [ ] A rest stop will not be included in this project.

12. ☐ Maintenance and repair of existing roadways that do not require approval from the TCEQ Executive Director. Modifications to existing roadways such as widening roads/adding shoulders totaling more than one-half (1/2) the width of one (1) existing lane require prior approval from the TCEQ.

Stormwater to be generated by the Proposed Project

13. ☒ **Attachment B - Volume and Character of Stormwater**. A detailed description of the volume (quantity) and character (quality) of the stormwater runoff which is expected to occur from the proposed project is attached. The estimates of stormwater runoff quality and quantity are based on the area and type of impervious cover. Include the runoff coefficient of the site for both pre-construction and post-construction conditions.

Wastewater to be generated by the Proposed Project

14. The character and volume of wastewater is shown below:

100 % Domestic	15,000 Gallons/day
_____% Industrial	_____Gallons/day
_____% Commingled	_____Gallons/day
TOTAL gallons/day 15,000 MAX	

15. Wastewater will be disposed of by:

☒ On-Site Sewage Facility (OSSF/Septic Tank):

☒ **Attachment C - Suitability Letter from Authorized Agent**. An on-site sewage facility will be used to treat and dispose of the wastewater from this site. The appropriate licensing authority's (authorized agent) written approval is attached. It states that the land is suitable for the use of private sewage facilities and will meet or exceed the requirements for on-site sewage facilities as specified under 30 TAC Chapter 285 relating to On-site Sewage Facilities.

☒ Each lot in this project/development is at least one (1) acre (43,560 square feet) in size. The system will be designed by a licensed professional engineer or registered sanitarian and installed by a licensed installer in compliance with 30 TAC Chapter 285.

☐ Sewage Collection System (Sewer Lines):

☐ Private service laterals from the wastewater generating facilities will be connected to an existing SCS.

☐ Private service laterals from the wastewater generating facilities will be connected to a proposed SCS.

☐ The SCS was previously submitted on_____.

☐ The SCS was submitted with this application.

☐ The SCS will be submitted at a later date. The owner is aware that the SCS may not be installed prior to Executive Director approval.

☐ The sewage collection system will convey the wastewater to the _____ (name) Treatment Plant. The treatment facility is:

- ☐ Existing.
- ☐ Proposed.

16. ☒ All private service laterals will be inspected as required in 30 TAC §213.5.

Site Plan Requirements

Items 17 – 28 must be included on the Site Plan.

17. ☒ The Site Plan must have a minimum scale of 1" = 400'.

Site Plan Scale: 1" = 30 '.

18. 100-year floodplain boundaries:

☐ Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled.

☒ No part of the project site is located within the 100-year floodplain.

The 100-year floodplain boundaries are based on the following specific (including date of material) sources(s): FEMA FIRM 48091C0280F (Effective 09/02/2009)

19. ☒ The layout of the development is shown with existing and finished contours at appropriate, but not greater than ten-foot contour intervals. Lots, recreation centers, buildings, roads, open space, etc. are shown on the plan.

☐ The layout of the development is shown with existing contours at appropriate, but not greater than ten-foot intervals. Finished topographic contours will not differ from the existing topographic configuration and are not shown. Lots, recreation centers, buildings, roads, open space, etc. are shown on the site plan.

20. All known wells (oil, water, unplugged, capped and/or abandoned, test holes, etc.):

☒ There are 6 (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply)

- ☒ The wells are not in use and have been properly abandoned.
- ☐ The wells are not in use and will be properly abandoned.
- ☐ The wells are in use and comply with 16 TAC §76.

☐ There are no wells or test holes of any kind known to exist on the project site.

21. Geologic or manmade features which are on the site:

- ☒ All sensitive geologic or manmade features identified in the Geologic Assessment are shown and labeled.
- ☐ No sensitive geologic or manmade features were identified in the Geologic Assessment.
- ☐ **Attachment D - Exception to the Required Geologic Assessment**. A request and justification for an exception to a portion of the Geologic Assessment is attached.

22. [X] The drainage patterns and approximate slopes anticipated after major grading activities.
23. [X] Areas of soil disturbance and areas which will not be disturbed.
24. [X] Locations of major structural and nonstructural controls. These are the temporary and permanent best management practices.
25. [X] Locations where soil stabilization practices are expected to occur.
26. [ ] Surface waters (including wetlands).

    [X] N/A
27. [ ] Locations where stormwater discharges to surface water or sensitive features are to occur.

    [X] There will be no discharges to surface water or sensitive features.
28. [X] Legal boundaries of the site are shown.

Administrative Information

29. [X] Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.
30. [X] Any modification of this WPAP will require Executive Director approval, prior to construction, and may require submission of a revised application, with appropriate fees.

Attachment A – Factors Affecting Water Quality

Factors Affecting Surface Water Quality

Erosion, sedimentation, and runoff will affect the surface water quality both during and after construction of the proposed development. During construction, temporary BMPs will be in place to minimize the effects of construction on water quality. After construction, permanent BMPs will be in place to reduce the impact of the proposed development

Activities that could affect water quality during construction include concrete truck washout, disturbance of soil by construction machinery, handling of construction equipment, and fuels present during construction. The temporary BMPs that will be utilized on-site during construction include reinforced filter fabric barrier, filter fabric fence, filter dam, and stabilized construction access. The application of these BMPs will prevent and filter sedimentation caused by construction activity from draining towards adjacent properties and/or TxDOT right-of-way.

Permanent factors that could impact water quality include landscape practices, runoff from on-site impervious cover, and washing of fire trucks. The permanent BMP that will be utilized on-site are vegetative filter strips. These filter strips treat sheet flow and reduce TSS loads. The application of the filter strips on-site will be used along the northern, eastern and western boundaries of the properties to treat flow from the site. The use of natural filter strips is limited to perimeter lots and other areas that will not drain by gravity to other BMPs on the site.

The existing vegetative filter strips in the roadside ditch along FM 306 will be reconstructed to coincide with the shoulder widening and ditch regrading within TxDOT right-of-way. These vegetative strips will continue to treat the runoff from FM 306.

Attachment B – Volume and Character of Stormwater

Volume and Character of Stormwater

Existing Conditions

The site is currently undeveloped, with no signs of impervious cover of any previous developments. The existing sheet flow runs from south to north at an average of 2-3% slope through the project site. The slopes are steeper on the west portion of the project site, averaging at about a 10% slope. There are several trees and shrubs in the project site and surrounding areas. As shown in the proposed drainage area map in the construction plans, 5.50 acres (OS-1 and OS-2) south of the property contribute flow to the project site.

PROJECT SITE - EXISTING PEAK FLOW CALCULATIONS (Q = C*i*A)								
DA Name	Area (AC)	Runoff Coefficient (C)	Q (2-year) (cfs)	Q (5-year) (cfs)	Q (10-year) (cfs)	Q (25-year) (cfs)	Q (50-year) (cfs)	Q (100-year) (cfs)
E1	3.17	0.49	7.55	9.72	11.23	13.34	15.28	17.15
E2	1.85	0.49	4.41	5.67	6.55	7.79	8.92	10.01
OS-1	4.84	0.49	11.53	14.85	17.15	20.37	23.34	26.18
OS-2	0.66	0.49	1.57	2.02	2.34	2.78	3.18	3.57
		TOTAL	**25.05**	**32.27**	**37.27**	**44.28**	**50.72**	**56.91**

ROADSITE DITCH - EXISTING PEAK FLOW CALCULATIONS (Q = C*i*A)								
DA Name	Area (AC)	Runoff Coefficient (C)	Q (2-year) (cfs)	Q (5-year) (cfs)	Q (10-year) (cfs)	Q (25-year) (cfs)	Q (50-year) (cfs)	Q (100-year) (cfs)
E2	1.85	0.49	4.41	5.67	6.55	7.79	8.92	10.01
OS-2	0.66	0.49	1.57	2.02	2.34	2.78	3.18	3.57
OS-3	5.43	0.49	12.93	16.66	19.24	22.86	26.18	29.37
OS-4*	1.98	0.65	6.29	8.10	9.36	11.12	12.73	14.29
		TOTAL	**25.20**	**32.46**	**37.49**	**44.54**	**51.02**	**57.24**

*Weighed Runoff Coefficient

Intensity (i) (in/hr)		4.86	6.26	7.23	8.59	9.84	11.04

Intensity based on a minimum time of concentration of 10 minutes (TxDOT Hydraulic Design Manual)

Runoff Coefficients (C)

			Source:
C=	0.49	Existing Rural Watershed	City of Bulverde Storm Drainage Design Criteria Manual
C=	0.49	Existing Roadside Ditch (30' Wide)	City of Bulverde Storm Drainage Design Criteria Manual
C=	0.85	Existing Asphalt Road (25' Wide)	TxDOT Hydraulic Design Criteria
C=	0.90	Proposed Concrete Pavement	TxDOT Hydraulic Design Criteria

OS-4 Calculation Values

Roadside Ditch Width (ft)	30
Asphalt Rdwy Width (ft)	25
Total Width (ft)	55

Proposed Conditions

The 5-acre site proposes approximately 0.80 acres of impervious cover. The impervious cover is attributed to concrete paving and a fire station building. The site will experience runoff from impervious cover as well as contributing off-site areas, which will be treated by vegetative filter strips installed on northern, eastern and western property limits. All existing trees are to remain on-site. A culvert under the proposed driveway that will connect to FM 306 will be constructed to match the existing flow patterns along the roadside ditch. There is no proposed storm sewer system onsite. The site has been designed to match existing drainage patterns (sheet-flow).

PROJECT SITE - PROPOSED PEAK FLOW CALCULATIONS (Q = C*i*A)									
DA Name	Impervious Area (AC)	Total Area (AC)	Runoff Coefficient (C)	Q (2-year) (cfs)	Q (5-year) (cfs)	Q (10-year) (cfs)	Q (25-year) (cfs)	Q (50-year) (cfs)	Q (100-year) (cfs)
P1*	0.411	3.61	0.54	9.42	12.13	14.01	16.64	19.06	21.39
P2*	0.391	1.41	0.60	4.14	5.33	6.15	7.31	8.38	9.40
OS-1	0	4.84	0.49	11.53	14.85	17.15	20.37	23.34	26.18
OS-2	0	0.66	0.49	1.57	2.02	2.34	2.78	3.18	3.57
			TOTAL	**26.65**	**34.33**	**39.65**	**47.10**	**53.96**	**60.54**

*Weighed Runoff Coefficient

DRIVEWAY CULVERT - PROPOSED PEAK FLOW CALCULATIONS (Q = C*i*A)									
DA Name	Impervious Area (AC)	Total Area (AC)	Runoff Coefficient (C)	Q (2-year) (cfs)	Q (5-year) (cfs)	Q (10-year) (cfs)	Q (25-year) (cfs)	Q (50-year) (cfs)	Q (100-year) (cfs)
P2*	0.391	1.41	0.60	4.14	5.33	6.15	7.31	8.38	9.40
OS-2	0	0.66	0.49	1.57	2.02	2.34	2.78	3.18	3.57
OS-3	0	5.43	0.49	12.93	16.66	19.24	22.86	26.18	29.37
OS-4*	1.002	1.98	0.67	6.47	8.33	9.62	11.43	13.10	14.69
			TOTAL	**25.11**	**32.34**	**37.35**	**44.38**	**50.84**	**57.04**

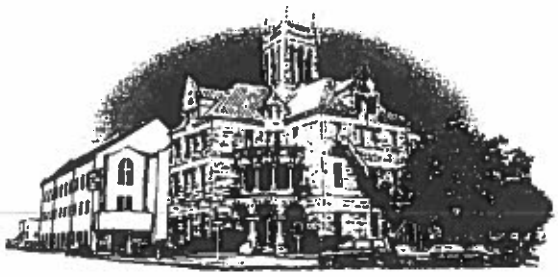
*Weighed Runoff Coefficient

Intensity (i) (in/hr)			4.86	6.26	7.23	8.59	9.84	11.04

Intensity based on a minimum time of concentration of 10 minutes (TxDOT Hydraulic Design Manual)

		Runoff Coefficients (C)	Source:
C=	0.49	Existing Rural Watershed	City of Bulverde Storm Drainage Design Criteria Manual
C=	0.49	Existing Roadside Ditch (30' Wide)	City of Bulverde Storm Drainage Design Criteria Manual
C=	0.85	Existing Asphalt Road (25' Wide)	TxDOT Hydraulic Design Criteria
C=	0.90	Proposed Concrete Pavement	TxDOT Hydraulic Design Criteria

OS-4 Calculation Values	
Roadside Ditch Width (ft)	30
Asphalt Rdwy Width (ft)	25
Total Width (ft)	55
Driveway Area (AC)	0.066
Shoulder Width Area (AC)	0.036



Comal County

OFFICE OF COMAL COUNTY ENGINEER

July 22, 2019

Mr. Carlos Pacas, E.I.T.
via e-mail: cpacas@dvoeng.com

Re: Comal County ESD No. 3 Fire Station 54 WPAP Suitability Letter, within Comal County, Texas

Dear Mr. Pacas:

In accordance with TAC §213.5(b)(4)(F)(ii), Comal County has found that the entire referenced site is suitable for the use of private sewage facilities and will meet the special requirements for on-site sewage facilities located on the Edwards Aquifer Recharge Zone as specified in TAC §285.40-42 based on the following information submitted to our office on July 22, 2019:

- The Geologic Assessment, prepared by Raba Kistner Environmental, Inc.

According to TAC §285.42(a), if any recharge feature is discovered during construction of an OSSF, all regulated activities near the feature shall be suspended immediately. The owner shall immediately notify the TCEQ San Antonio office of the discovery of the feature. All activities regulated under TAC §213 shall not proceed near the feature until Comal County, in conjunction with the TCEQ San Antonio office, has reviewed and approved a plan proposed to protect the feature, the structural integrity of the OSSF, and the water quality of the aquifer. The plan shall be sealed, signed, and dated by a professional engineer.

If you have any questions or need additional information, please do not hesitate to contact our office.

Sincerely,

Robert Boyd, P.E.
Comal County Assistant Engineer

cc: Jen Crownover, Comal County Commissioner Precinct No. 4

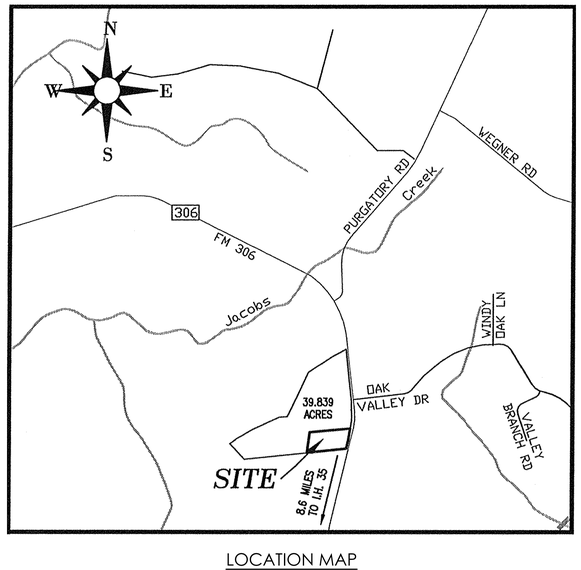
Site Plan

COMAL COUNTY ESD
FIRE AND EMS
STATION 54

COMAL COUNTY, TEXAS
PLANS FOR CONSTRUCTION
OF

PAVING AND DRAINAGE

8685 FM 306
CANYON LAKE, TEXAS 78133
5.010 ACRES



LOCATION MAP
SCALE: 1"=1000'

DVO
825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293 - 7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

SHEET INDEX	
Sheet No.	Sheet Title
C1	COVER SHEET
C2	DIMENSION CONTROL PLAN
C3	UTILITY PLAN
C4	PAVING PLAN
C5	GRADING AND DRAINAGE PLAN
C6	DRIVEWAY AND DITCH PROFILES
C7	F.M. 306 SHOULDER WIDENING
C8	EXISTING DRAINAGE PLAN
C9	PROPOSED DRAINAGE PLAN
C10	MISCELLANEOUS DETAILS
C11	TXDOT CONSTRUCTION GENERAL NOTES
C12	TXDOT STANDARD DETAILS
C13	POLLUTION PREVENTION PLAN
C14	POLLUTION PREVENTION PLAN DETAILS SHEET 1 OF 2
C15	POLLUTION PREVENTION PLAN DETAILS SHEET 2 OF 2
C16	TRAFFIC CONTROL PLAN DETAILS SHEET 1 OF 2
C17	TRAFFIC CONTROL PLAN DETAILS SHEET 2 OF 2
C18	TOPOGRAPHIC SURVEY (FOR REFERENCE ONLY)
C19	WPAP PERMANENT BMP PLAN FIRE STATION NO. 54
C20	WPAP PERMANENT BMP PLAN F.M. 306

⚠

DATE:	INITIALS:	REVISIONS:
07/24/19	JWD	POST BID ADDENDUM NO. 1
07/12/19	JWD	PERMIT REVISIONS
06/06/19	JWD	POST BID ADDENDUM
05/03/19	JWD	ADDENDUM NO. 1

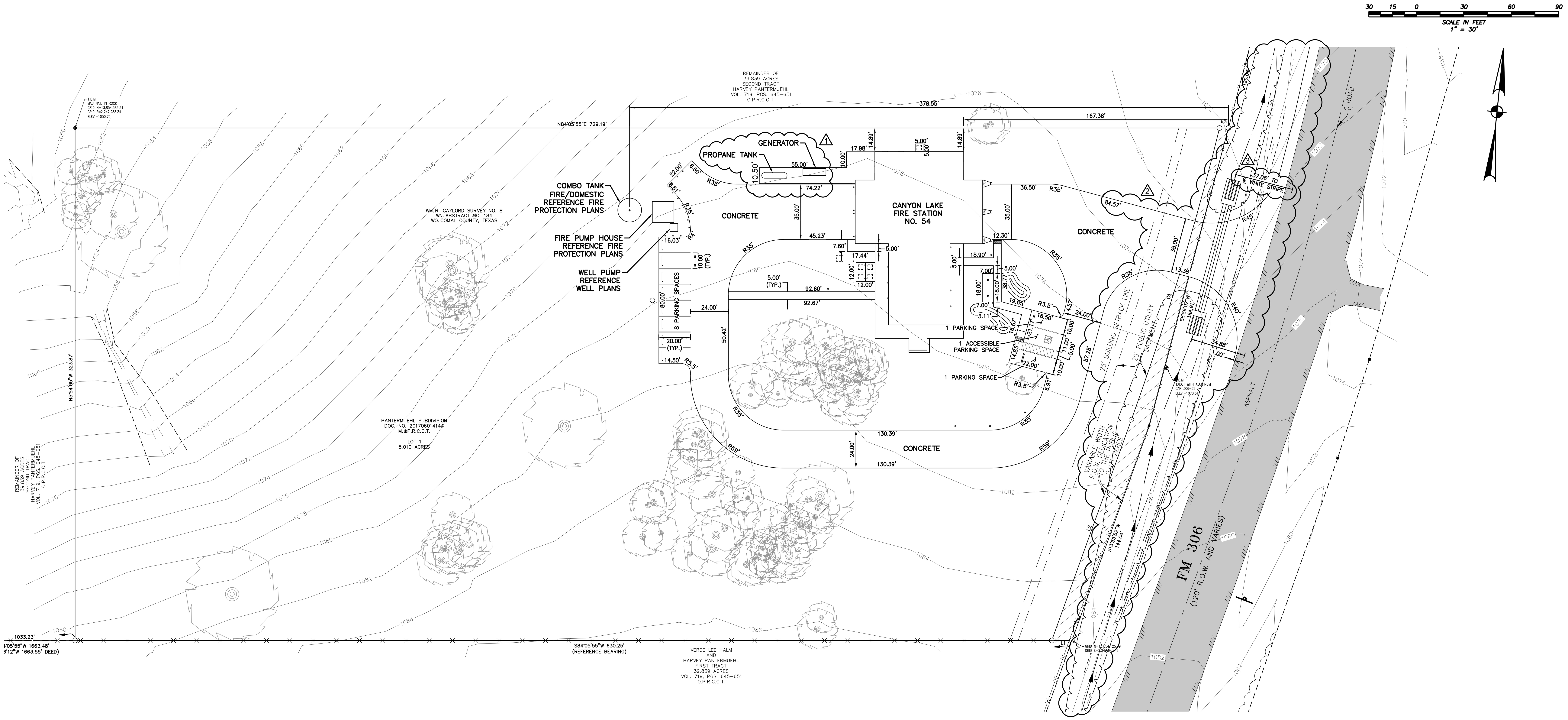
⚠

STATE OF TEXAS
JASON W. DAWSON
108125
LICENSED
PROFESSIONAL ENGINEER
6-6-19

C1

CCESD3 FIRE STATION 54 - 182017

PRIVATE PLANS



BENCHMARK:
ALUMINUM TXDOT DISK LOCATED AT THE NORTHERN EAST CORNER OF THE INTERSECTION OF F.M. 306 AND HOFFMAN LANE.
ELEV.=932.76, [PUBLISHED ELEV.=932.73']
GRID N=13,838,059.68, GRID E=2,252,182.89
(SCALE FACTOR OF 1.00014 FOR SURFACE ADJ.)

FLOODPLAIN:
THIS TRACT IS LOCATED IN UNSHADED ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS SHOWN ON FLOOD INSURANCE RATE MAP FOR COMAL COUNTY, TEXAS COMMUNITY PANEL NUMBER 48091C0280F, EFFECTIVE DATE SEPTEMBER 2, 2009 AS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

LEGEND

Symbol	Description
⊙	1/2" IRON ROD FOUND WITH PLASTIC CAP "URBAN CIVIL"
●	1/2" IRON PIN FOUND
▪	CORNER POST (SIZE NOTED)
⬡	TXDOT CONRETE MONUMENT TYPE 1
◉	MAG NAIL FOUND
M.&P.R.C.C.T.	MAP AND PLAT RECORDS COMAL COUNTY TEXAS
O.P.R.C.C.T.	OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS
R.O.W.	RIGHT-OF-WAY
	EDGE OF ASPHALT
	WIRE FENCE
	PUBLIC UTILITY EASEMENT
	BUILDING SETBACK LINE
	ASPHALT
	RIGHT-OF-WAY DEDICATION TO THE PUBLIC

GENERAL CONSTRUCTION NOTES:

1. EXISTING CONDITIONS AND UNDERGROUND UTILITIES SHOWN ON PLANS ARE NOT GUARANTEED TO BE COMPLETE OR DEFINITE, BUT WERE OBTAINED FROM THE BEST INFORMATION AVAILABLE. CONTRACTOR TO FIELD VERIFY CONDITIONS PRIOR TO STARTING CONSTRUCTION.
2. CONTRACTOR TO VERIFY ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION.
3. THE LOCATION OF ALL UTILITIES PRESENTED ON THESE DRAWINGS IS SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
4. CONTRACTOR TO OBTAIN ALL PERMITS AND APPROVALS REQUIRED PRIOR TO STARTING CONSTRUCTION.
5. ALL DIMENSIONS ARE TO EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.

DVO PROJECT – 182017

BROWN REYNOLDS WATFORD ARCHITECTS
2700 EARL RUDDER FRWY SOUTH
SUITE 4000
COLLEGE STATION, TEXAS 77845
979.694.1791
WWW.BRWARCH.COM

STATE OF TEXAS
JASON W. DAWSON
108125
LICENSED PROFESSIONAL ENGINEER
6-6-19

DVO
825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293-7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

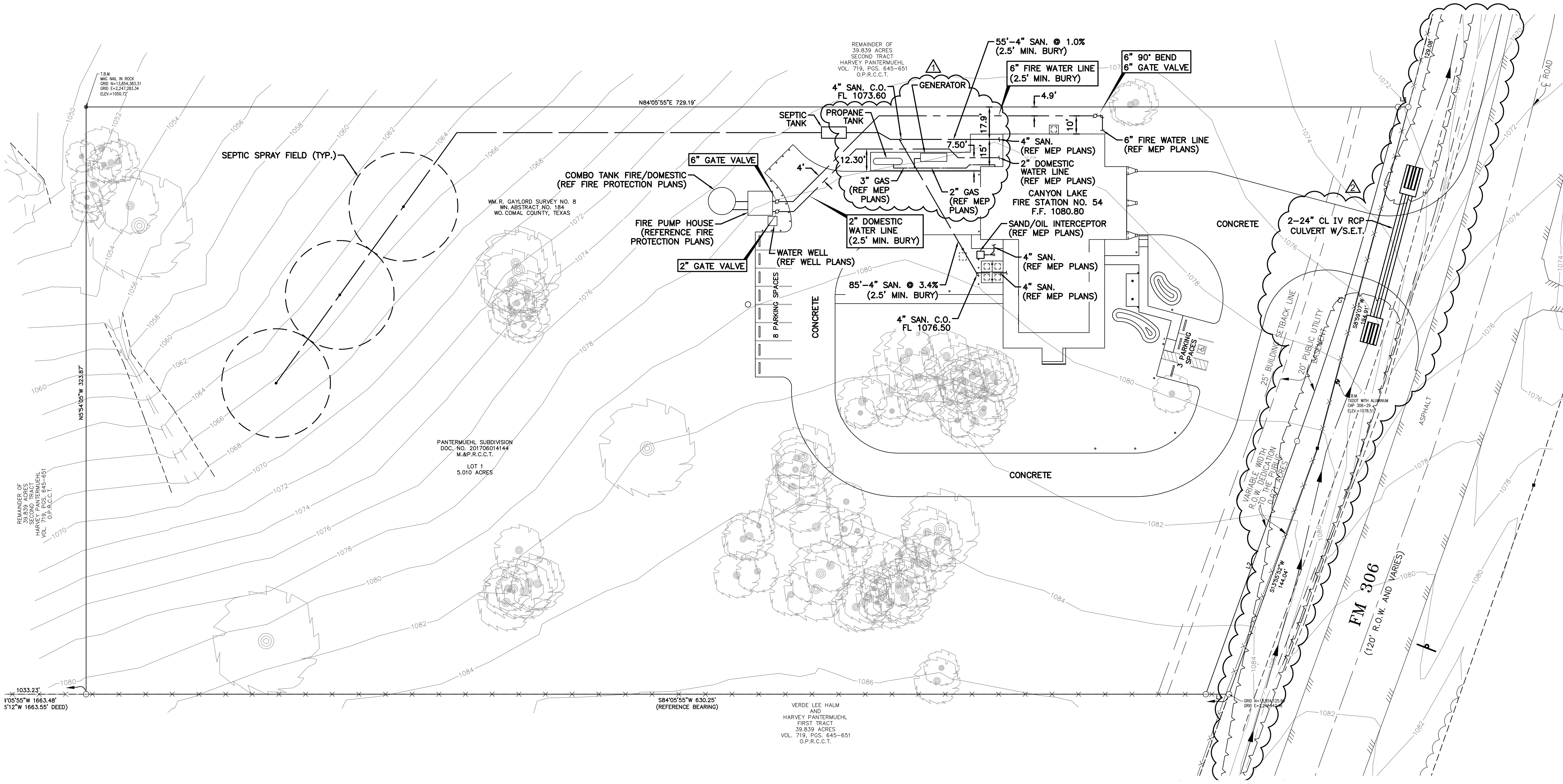
DATE 04/08/2019
DRAWN BY
CHECKED BY
BRW PROJECT NUMBER 218007.00

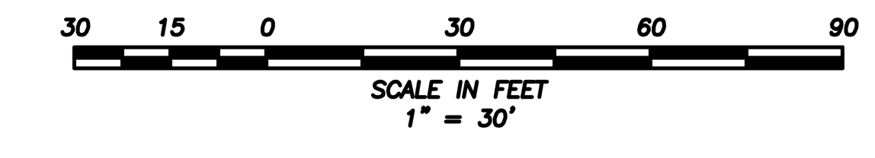
COMAL COUNTY ESD
FIRE AND EMS
STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

NO.	INI.	REVISION	DATE
1	JWD	ADDENDUM NO. 1	05/03/19
2	JWD	POST BID ADDENDUM	06/06/19
3	JWD	PERMIT REVISIONS	07/12/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C2

DIMENSION CONTROL PLAN





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●	1/2" IRON PIN FOUND
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⬡	TXDOT CONRETE MONUMENT TYPE 1
◉	MAG NAIL FOUND
M.&P.R.C.C.T.	MAP AND PLAT RECORDS COMAL COUNTY TEXAS
O.P.R.C.C.T.	OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS
R.O.W.	RIGHT-OF-WAY
——//// ——	EDGE OF ASPHALT
——×——×——	WIRE FENCE
— — — —	PUBLIC UTILITY EASEMENT
——— ———	BUILDING SETBACK LINE
CL IV RCP	CLASS IV REINFORCED CONCRETE PIPE
S.E.T.	SAFETY END TREATMENT

GENERAL CONSTRUCTION NOTES:

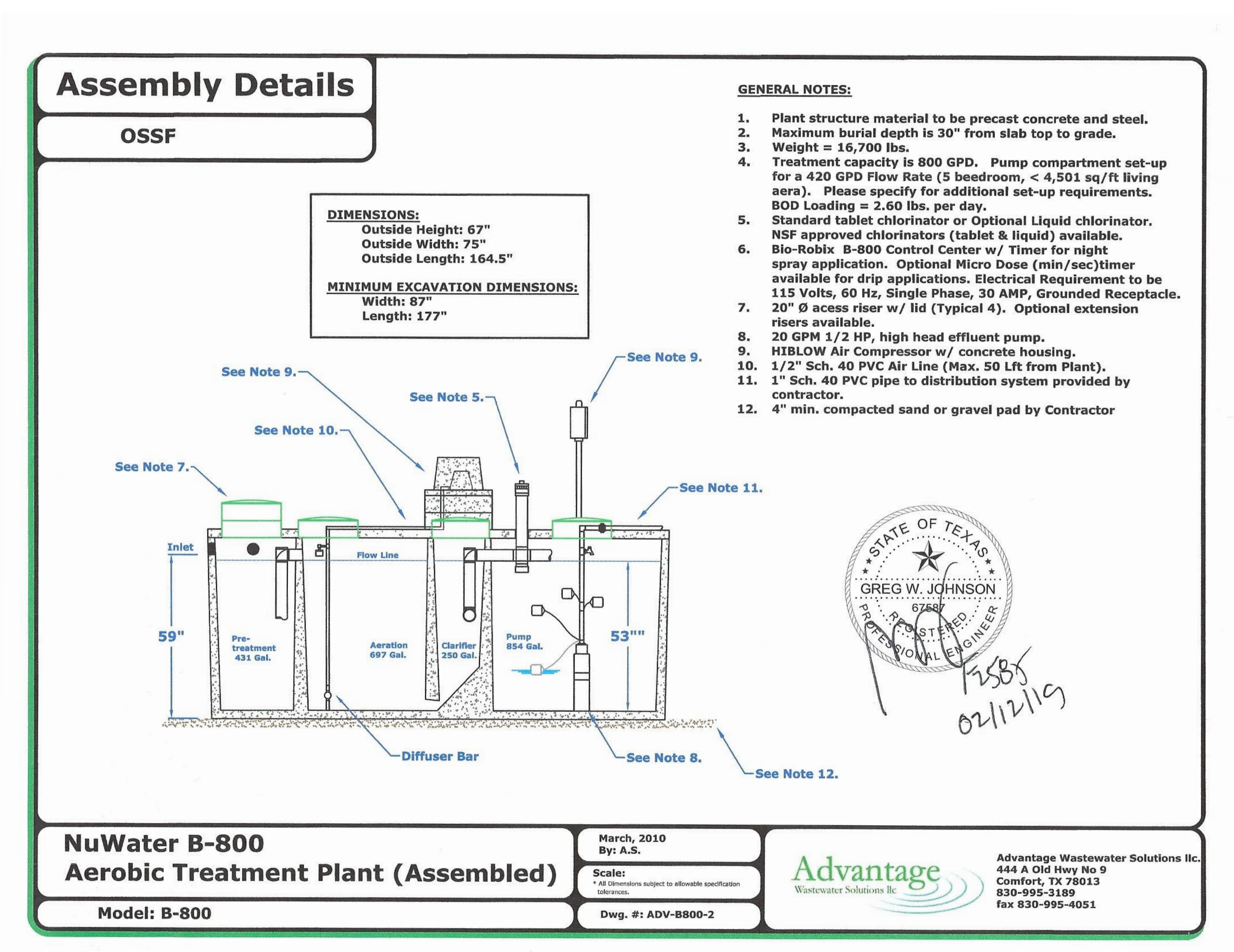
1. EXISTING CONDITIONS AND UNDERGROUND UTILITIES SHOWN ON PLANS ARE NOT GUARANTEED TO BE COMPLETE OR DEFINITE, BUT WERE OBTAINED FROM THE BEST INFORMATION AVAILABLE.
2. CONTRACTOR TO VERIFY ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION.
3. THE LOCATION OF ALL UTILITIES PRESENTED ON THESE DRAWINGS IS SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
4. CONTRACTOR TO OBTAIN ALL PERMITS AND APPROVALS REQUIRED PRIOR TO STARTING CONSTRUCTION.
5. ALL DIMENSIONS ARE TO EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.

STANDARD WATER NOTES FOR PLANS

1. NO CONSTRUCTION ACTIVITIES SHALL BEGIN UNTIL A PRECONSTRUCTION MEETING HAS BEEN HELD BETWEEN THE CONTRACTOR, ENGINEER OF RECORD, AND A REPRESENTATIVE OF CLWSC.
2. IT IS THE INTENT OF THESE PLANS TO SHOW THE LOCATION OF EXISTING UNDERGROUND FACILITIES IN ACCORDANCE WITH EXISTING RECORDS. HOWEVER, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO LOCATE AND VERIFY THE EXACT LOCATION OF ALL EXISTING UNDERGROUND FACILITIES PRIOR TO EXCAVATION. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ANY AND ALL DAMAGES TO EXISTING FACILITIES.
3. BOUNDARY FENCES OR OTHER IMPROVEMENTS REMOVED TO PERMIT CONSTRUCTION SHALL BE REPLACED IN THE SAME LOCATION AND IN SAME CONDITION AS GOOD OR BETTER THAN IN WHICH THEY WERE FOUND. NO COMPENSATION SHALL BE GIVEN TO THE CONTRACTOR FOR REMOVAL AND REPLACEMENT OF FENCES.
4. CONTRACTOR SHALL NOTIFY THE CLWSC (830-964-3854) AT LEAST 72 HOURS PRIOR TO COMMENCING CONSTRUCTION.
5. THE CONTRACTOR IS RESPONSIBLE FOR KEEPING STREETS AND SIDEWALKS ADJACENT TO PROJECT FREE OF MUD AND DEBRIS FROM THE CONSTRUCTION.
6. CONTRACTOR SHALL NOT PLACE FILL OR WASTE MATERIAL ON ANY PRIVATE PROPERTY WITHOUT PRIOR WRITTEN AGREEMENT WITH THE PROPERTY OWNER. A COPY OF ANY WRITTEN AGREEMENT BETWEEN PROPERTY OWNER AND CONTRACTOR SHALL BE FURNISHED TO CLWSC.
7. NO EXCESS EXCAVATION MATERIAL SHALL BE DEPOSITED IN LOW AREAS OR ALONG NATURAL DRAINAGE WAY WITHOUT WRITTEN PERMISSION FROM THE ENGINEER.
8. ALL VEGETATED AREAS DISTURBED BY CONSTRUCTION ACTIVITIES SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITIONS THAN FOUND PRIOR TO THE BEGINNING OF CONSTRUCTION.
9. BEFORE FINAL COMPLETION OF THE PROPOSED WORK, ALL ROADWAY, SLOPES, DITCHES AND BERMS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION.
10. REMOVE AND DISPOSE OF TREES, STUMPS, BRUSH, ROOTS, VEGETATION, LOGS, RUBBISH AND OTHER OBJECTIONABLE MATTER WITHIN THE LIMITS OF AREA AFFECTED BY THE WORK, INCLUDING ALL AREAS TO BE RE-GRADED. PROTECT TREES, SHRUBS, AND OTHER LANDSCAPE FEATURES SPECIFICALLY DESIGNATED FROM DAMAGE DURING CONSTRUCTION OPERATIONS.
11. CONTACTOR TO CONFIRM ACTUAL HORIZONTAL AND VERTICAL LOCATION OF EXISTING STRUCTURES, PIPING, PAVING, FENCING AND ALL OTHER EXISTING FACILITIES PRIOR TO CONSTRUCTION.
12. CONTRACTOR SHALL COORIDINAT FOR ALL NECESSARY UTILITY LOCATES AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.
13. CONTRACTOR SHALL NOTIFY TEXAS DEPARTMENT OF TRANSPORTATION AT LEAST 48 HOURS PRIOR TO ANY CONSTRUCTION ACTIVITY WITHIN THE STATE RIGHT-OF-WAY.
14. CONTRACTOR SHALL NOT OPEN CUT ANY IMPROVED DRIVEWAY IN STATE RIGHT-OF-WAY WITHOUT PRIOR WRITTEN APPROVAL OF PROPERTY OWNER.
15. FINE GRADE AREAS TO ACHIEVE FINAL CONTOURS INDICATED OR RESTORE EXISTING GRADES. REMOVE RUBBISH VEGETATION AND ROCKS OVER 1 ½" IN DIAMETER. ADJUST CONTOURS TO ACHIEVE POSITIVE DRAINAGE AWAY FROM STRUCTURES. PROVIDE UNIFORM ROUNDING AT TOP AND BOTTOM OF SLOPES AND OTHER BREAKS IN GRADE. CORRECT IRREGULARITIES AND AREAS WHERE WATER WILL STAND.
16. NO UTILITY TRENCHES OR PITS ARE TO BE LEFT OPEN OVERNIGHT. CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING ADEQUATE SAFETY MEASURES ARE IN PLACE FOR BOTH HUMANS AND LIVESTOCK FOR ANY TRENCH LEFT OPEN OVERNIGHT. BACKFILLING WILL OCCUR DAILY AND AS SOON AS PRACTICAL FOLLOWING CONSTRUCTION OPERATIONS.
17. THE MOST RECENT CLWSC STANDARDS AND SPECIFICATIONS SHALL APPLY TO ALL CONSTRUCTION REGARDLESS OF INFORMATION PROVIDED ON PLANS. CONTRACTORS ARE ENCOURAGED TO VERIFY CURRENT INFORMATION WITH CLWSC STAFF PRIOR TO THE BEGINNING OF CONSTRUCTION.
18. ALL ROAD CROSSING UNDER COMAL COUNTY ROADWAYS SHALL REQUIRE A SEPARATE PERMIT FROM THE COMAL COUNTY ENGINEER. CONTRACTOR IS RESPONSIBLE FOR AQUIRING ALL NECESSARY PERMITS AND SHALL CONSTRUCT ALL CROSSINGS IN ACCORDANCE WITH COMAL COUNTY STANDARDS.

CONTRACTOR SHALL:

19. FOLLOW METHODS AND PROCEDURES OF SHUTDOWN AS DIRECTED BY THE CLWSC STAFF.
20. NOTIFY CONSUMERS OF, AND COORDINATE ALL SHUTDOWNS WITH CLWSC, PER CLWSC GUIDELINES.
21. ESTABLISH PIPE GRADES USING TOP OF FINISHED GRADE UNLESS OTHERWISE INDICATED ON PLANS.
22. GRADE MAIN TO AVOID USE OF AIR VALVES.
23. MAINTAIN MINIMUM 10 FEET CLEARANCE BETWEEN MAINS AND SANITARY SEWERS.
24. CONSTRUCT ALL CROSSINGS WITH SANITARY SEWER FACILITIES IN ACCORDANCE WITH THE MOST RECENT VERSION OF APPLICABLE TCEQ STANDARDS.
25. MAINTAIN MINIMUM 10 FEET CLEARANCE BETWEEN HYDRANTS AND DRIVEWAYS.
26. INSTALL SERVICES SUCH THAT CONSUMER'S LINES DO NOT CROSS DRIVEWAYS.
27. SHALL PROVIDE A CLEAN NEAT AS-BUILT DRAWING WITHIN 30 DAYS OF JOB COMPLETION IN BOTH PAPER AND ELECTRONIC (.PDF) FORMAT.
28. USE DUCTILE IRON FITTING WITH MECHANICAL JOINT AND MEGALUG PER CLWSC STANDARD SPECIFICATIONS ON ALL PIPE REGARDLESS OF PIPE MATERIAL UNLESS OTHERWISE INDICATED ON PLANS.
29. INSTALL ALL APPERTENANCES ON WATER MAIN IN ACCORDANCE WITH APPLICABLE CLWSC STANDARD DETAILS.
30. INSTALL TRACER WIRE ON ALL WATER MAINS LOCATED IN COMMERCIAL SUBDIVIONS AND RESIDENTAL SUBDIVISIONS WITH URBAN STREET CROSS SECTIONS.
31. MAINTAIN A COPY OF THE STAMPED SET OF PLANS "APPROVED FOR CONSTRUCTION" ON THE JOB SITE AT ALL TIMES.



Assembly Details

OSSF

DIMENSIONS:
Outside Height: 67"
Outside Width: 75"
Outside Length: 164.5"

MINIMUM EXCAVATION DIMENSIONS:
Width: 87"
Length: 177"

GENERAL NOTES:

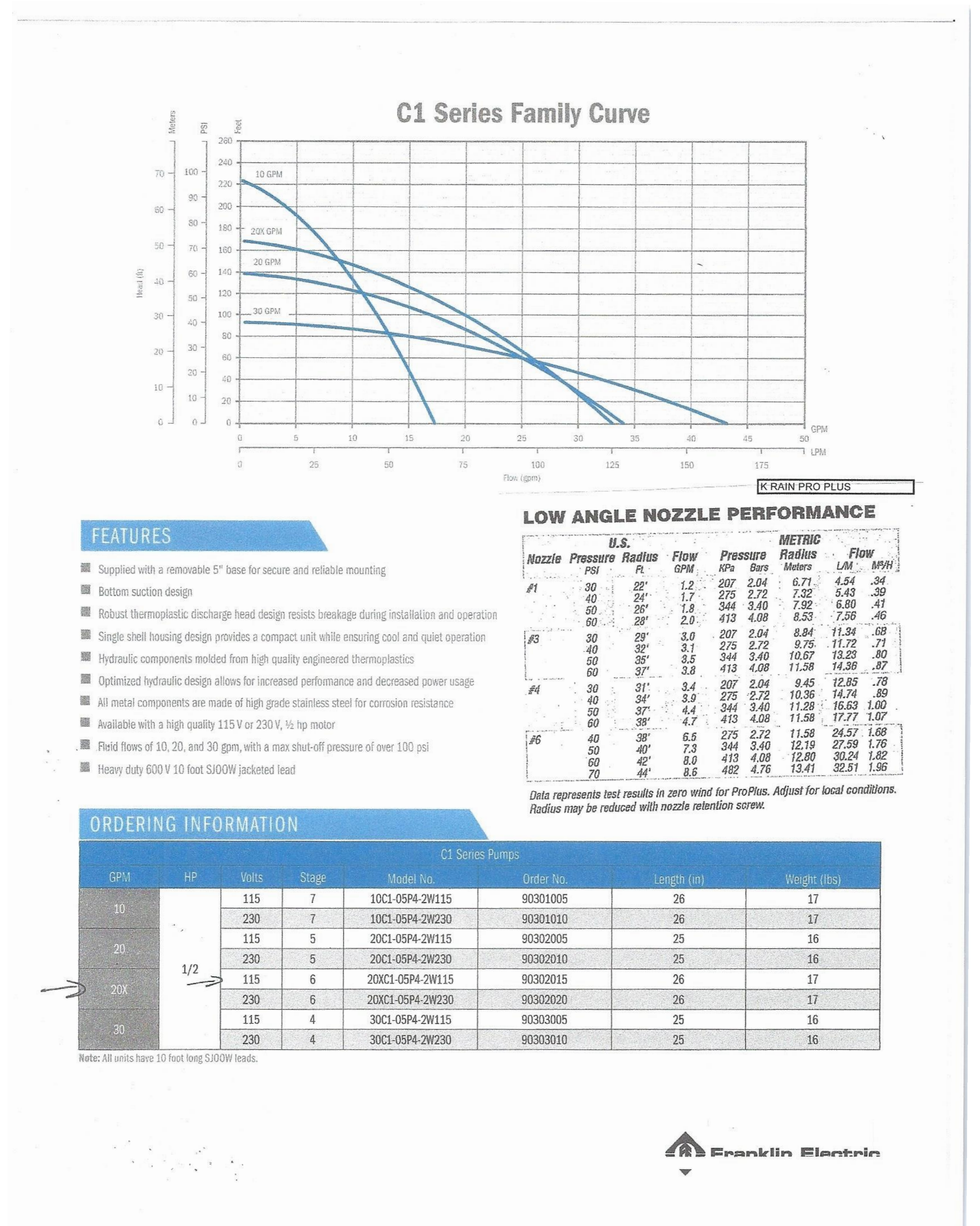
1. Plant structure material to be precast concrete and steel.
2. Maximum burial depth is 30" from slab top to grade.
3. Weight = 16,700 lbs.
4. Treatment capacity is 800 GPD. Pump compartment set-up for a 420 GPD Flow Rate (5 beedroom, < 4,501 sq/ft living aera). Please specify for additional set-up requirements. BOD Loading = 2.60 lbs. per day.
5. Standard tablet chlorinator or Optional Liquid chlorinator. NSF approved chlorinators (tablet & liquid) available.
6. Bio-Robix B-800 Control Center w/ Timer for night spray application. Optional Micro Dose (min/sec)timer available for drip applications. Electrical Requirement to be 115 Volts, 60 Hz, Single Phase, 30 AMP, Grounded Receptacle.
7. 20" Ø acess riser w/ lid (Typical 4). Optional extension risers available.
8. 20 GPM 1/2 HP, high head effluent pump.
9. HIBLOW Air Compressor w/ concrete housing.
10. 1/2" Sch. 40 PVC Air Line (Max. 50 Lft from Plant).
11. 1" Sch. 40 PVC pipe to distribution system provided by contractor.
12. 4" min. compacted sand or gravel pad by Contractor

NuWater B-800
Aerobic Treatment Plant (Assembled)
Model: B-800

March, 2010
By: A.S.
Scale:
* All Dimensions subject to allowable specification tolerances.
Dwg. #: ADV-B800-2

Advantage Wastewater Solutions llc
Advantage Wastewater Solutions llc.
444 A Old Hwy No 9
Comfort, TX 78013
830-995-3189
fax 830-995-4051

SEPTIC TANK DETAIL



C1 Series Family Curve

FEATURES

- Supplied with a removable 5" base for secure and reliable mounting
- Bottom suction design
- Robust thermoplastic discharge head design resists breakage during installation and operation
- Single shell housing design provides a compact unit while ensuring cool and quiet operation
- Hydraulic components molded from high quality engineered thermoplastics
- Optimized hydraulic design allows for increased performance and decreased power usage
- All metal components are made of high grade stainless steel for corrosion resistance
- Available with a high quality 115 V or 230 V, ½ hp motor
- Field flows of 10, 20, and 30 gpm, with a max shut-off pressure of over 100 psi
- Heavy duty 600 V 10 foot SJOOW jacketed lead

LOW ANGLE NOZZLE PERFORMANCE

Nozzle	U.S. Pressure PSI	U.S. Radius Ft.	U.S. Flow GPM	METRIC Pressure KPa	METRIC Pressure Bars	METRIC Radius Meters	METRIC Flow L/M	METRIC Flow M³/H
#1	30	22'	1.2	207	2.04	6.71	4.54	.34
	40	24'	1.7	275	2.72	7.32	5.43	.39
	50	26'	1.8	344	3.40	7.92	6.80	.41
	60	28'	2.0	413	4.08	8.53	7.56	.46
#3	30	29'	3.0	207	2.04	8.84	11.34	.68
	40	32'	3.1	275	2.72	9.75	11.72	.71
	50	35'	3.5	344	3.40	10.67	13.23	.80
	60	37'	3.8	413	4.08	11.58	14.36	.87
#4	30	31'	3.4	207	2.04	9.45	12.85	.78
	40	34'	3.9	275	2.72	10.36	14.74	.89
	50	37'	4.4	344	3.40	11.28	16.63	1.00
	60	38'	4.7	413	4.08	11.58	17.77	1.07
#6	40	38'	6.5	275	2.72	11.58	24.57	1.68
	50	40'	7.3	344	3.40	12.19	27.59	1.76
	60	42'	8.0	413	4.08	12.80	30.24	1.82
	70	44'	8.6	482	4.76	13.41	32.51	1.96

Data represents test results in zero wind for ProPlus. Adjust for local conditions. Radius may be reduced with nozzle retention screw.

ORDERING INFORMATION

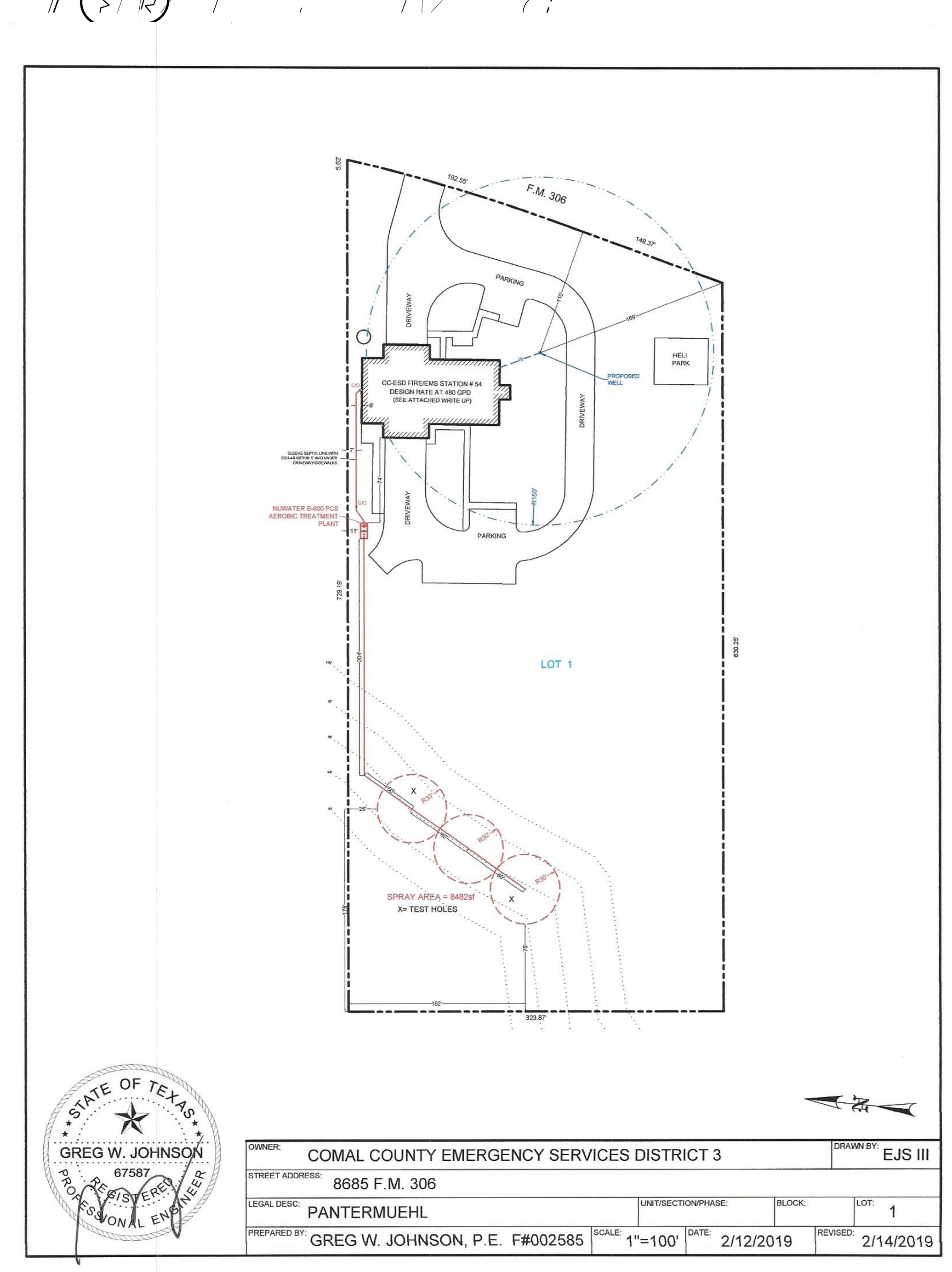
C1 Series Pumps

GPM	HP	Volts	Stage	Model No.	Order No.	Length (in)	Weight (lbs)
10	1/2	115	7	10C1-05P4-2W115	90301005	26	17
		230	7	10C1-05P4-2W230	90301010	26	17
20		115	5	20C1-05P4-2W115	90302005	25	16
		230	5	20C1-05P4-2W230	90302010	25	16
20X		115	6	20XC1-05P4-2W115	90302015	26	17
		230	6	20XC1-05P4-2W230	90302020	26	17
30		115	4	30C1-05P4-2W115	90303005	25	16
		230	4	30C1-05P4-2W230	90303010	25	16

Note: All units have 10 foot long SJOOW leads.

Franklin Electric

SEPTIC SPRAY HEADS



OWNER: COMAL COUNTY EMERGENCY SERVICES DISTRICT 3			DRAWN BY: EJS III
STREET ADDRESS: 8685 F.M. 306			
LEGAL DESC: PANTERMUEHL	UNIT/SECTION/PHASE:	BLOCK:	LOT: 1
PREPARED BY: GREG W. JOHNSON, P.E. F#002585	SCALE: 1"=100'	DATE: 2/12/2019	REVISED: 2/14/2019

SEPTIC DESIGN PLAN

BROWN REYNOLDS WATFORD ARCHITECTS
2700 EARL RUDDER FRWY SOUTH
SUITE 4000
COLLEGE STATION, TEXAS 77845
979-694-1791
WWW.BRWARCH.COM
BRW

STATE OF TEXAS
JASON W. DAWSON
108125
LICENSED PROFESSIONAL ENGINEER
6-6-19

DVO
825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293-7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

DATE	04/08/2019
DRAWN BY	
CHECKED BY	
BRW PROJECT NUMBER	218007.00

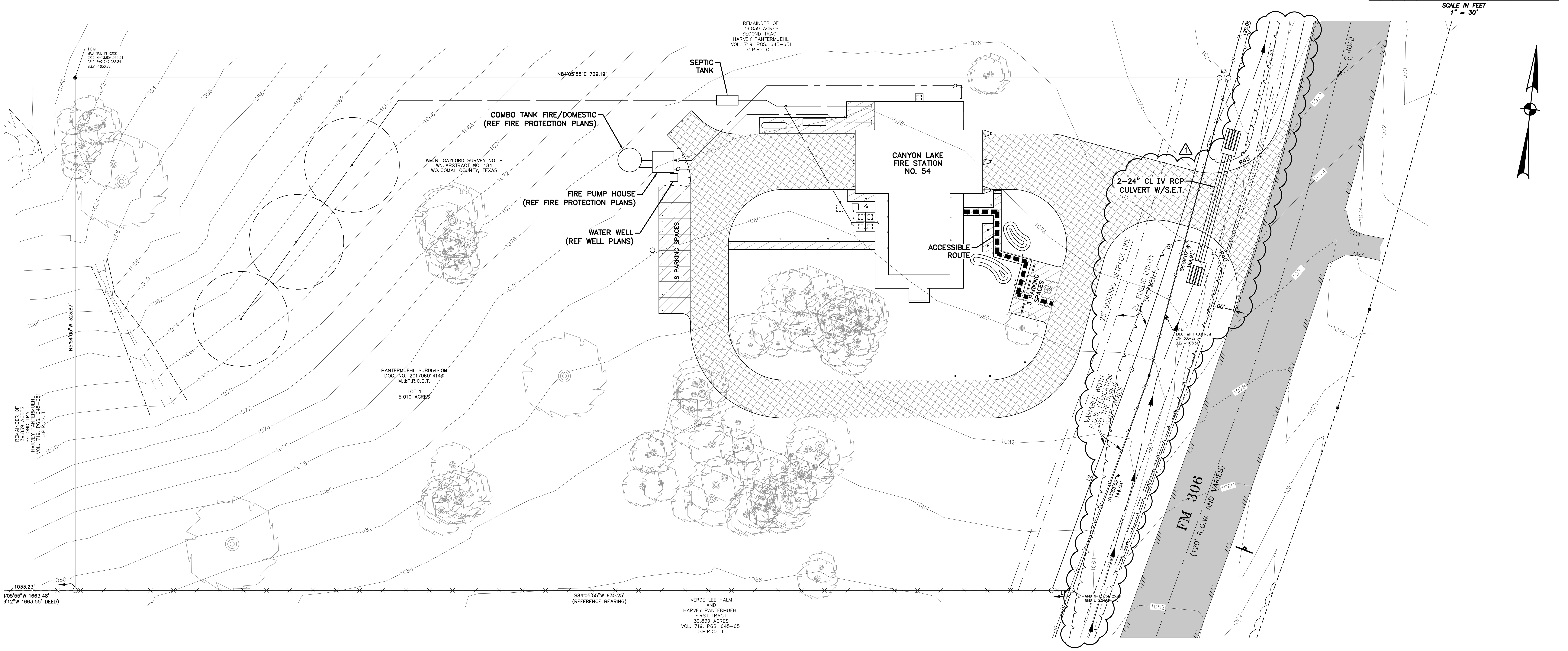
CANYON LAKE EST 1964 FIRE / EMS

COMAL COUNTY ESD
FIRE AND EMS
STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

NO.	INI.	REVISION	DATE
1	JWD	ADDENDUM NO. 1	05/03/19
2	JWD	POST BID ADDENDUM	06/06/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C3

UTILITY PLAN



BENCHMARK:
ALUMINUM TXDOT DISK LOCATED AT THE NORTHERN EAST CORNER OF THE INTERSECTION OF F.M. 306 AND HOFFMAN LANE.
ELEV.=932.76, [PUBLISHED ELEV.=932.73']
GRID N=13,838,059.68, GRID E=2,252,182.89
(SCALE FACTOR OF 1.00014 FOR SURFACE ADJ.)

FLOODPLAIN:
THIS TRACT IS LOCATED IN UNSHADED ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS SHOWN ON FLOOD INSURANCE RATE MAP FOR COMAL COUNTY, TEXAS COMMUNITY PANEL NUMBER 48091C0280F, EFFECTIVE DATE SEPTEMBER 2, 2009 AS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

LEGEND

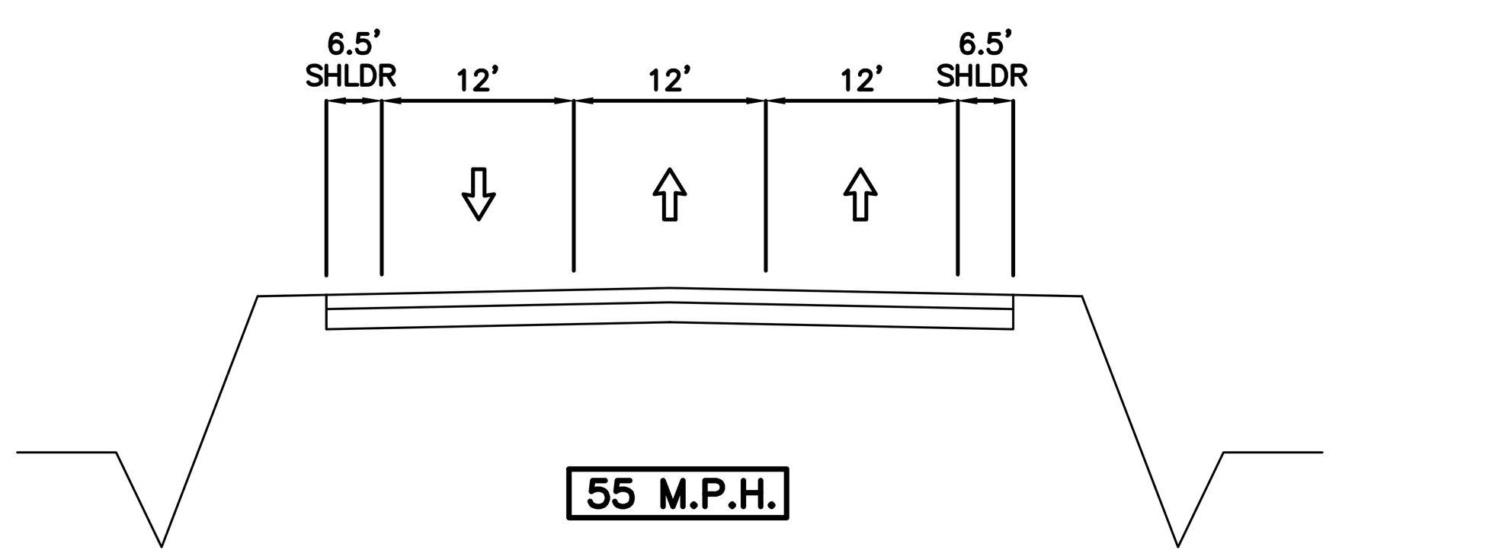
Symbol	Description
⊙	1/2" IRON ROD FOUND WITH PLASTIC CAP "URBAN CIVIL"
●	1/2" IRON PIN FOUND
▪	CORNER POST (SIZE NOTED)
⬡	TXDOT CONRETE MONUMENT TYPE 1
◉	MAG NAIL FOUND
M.&P.R.C.C.T.	MAP AND PLAT RECORDS COMAL COUNTY TEXAS
O.P.R.C.C.T.	OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS
R.O.W.	RIGHT-OF-WAY
	EDGE OF ASPHALT
	WIRE FENCE
	PUBLIC UTILITY EASEMENT
	BUILDING SETBACK LINE
	EXISTING ASPHALT PAVEMENT
	5.5" CONCRETE PAVEMENT (SEE GEOTECHNICAL REPORT)
	8" CONCRETE PAVEMENT (SEE GEOTECHNICAL REPORT)

GENERAL CONSTRUCTION NOTES:

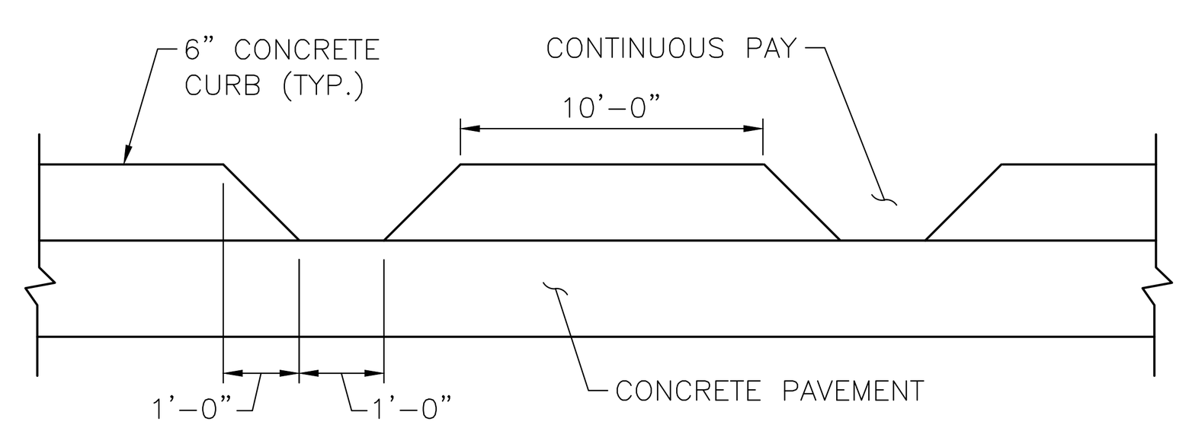
1. EXISTING CONDITIONS AND UNDERGROUND UTILITIES SHOWN ON PLANS ARE NOT GUARANTEED TO BE COMPLETE OR DEFINITE, BUT WERE OBTAINED FROM THE BEST INFORMATION AVAILABLE.
2. CONTRACTOR TO VERIFY ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION.
3. THE LOCATION OF ALL UTILITIES PRESENTED ON THESE DRAWINGS IS SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
4. CONTRACTOR TO OBTAIN ALL PERMITS AND APPROVALS REQUIRED PRIOR TO STARTING CONSTRUCTION.
5. ALL DIMENSIONS ARE TO EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
6. CONTRACTOR TO GRADE TO NATURAL GROUND AT A MAXIMUM SLOPE OF 3:1.
7. CONTRACTOR TO GRADE TO DRAIN AT A MAXIMUM SLOPE OF 3:1.
8. CONTRACTOR TO VERIFY THAT ALL ADA AREAS COMPLY WITH MAXIMUM CROSS SLOPES OF 2%, AND MAXIMUM RUN SLOPES OF 5%.

PAVEMENT NOTES:

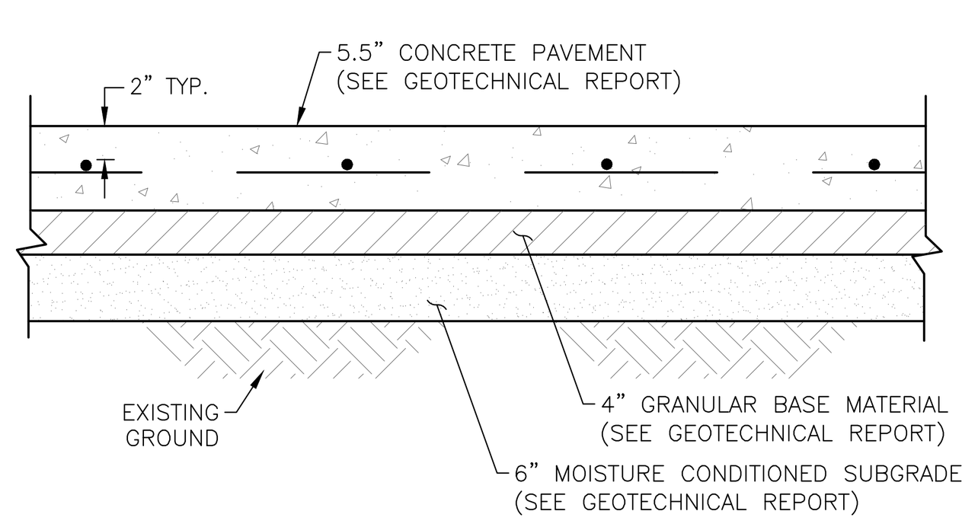
1. REFER TO GEOTECHNICAL REPORT PREPARED BY TERRACON, PROJECT NO. 90185283 FOR ADDITIONAL INFORMATION.
2. IF LIMESTONE IS EXPOSED AS THE PAVEMENT SUBGRADE, SEE GEOTECHNICAL REPORT FOR ALTERNATE CONCRETE PAVEMENT SECTION AND SUBGRADE PREPARATION.



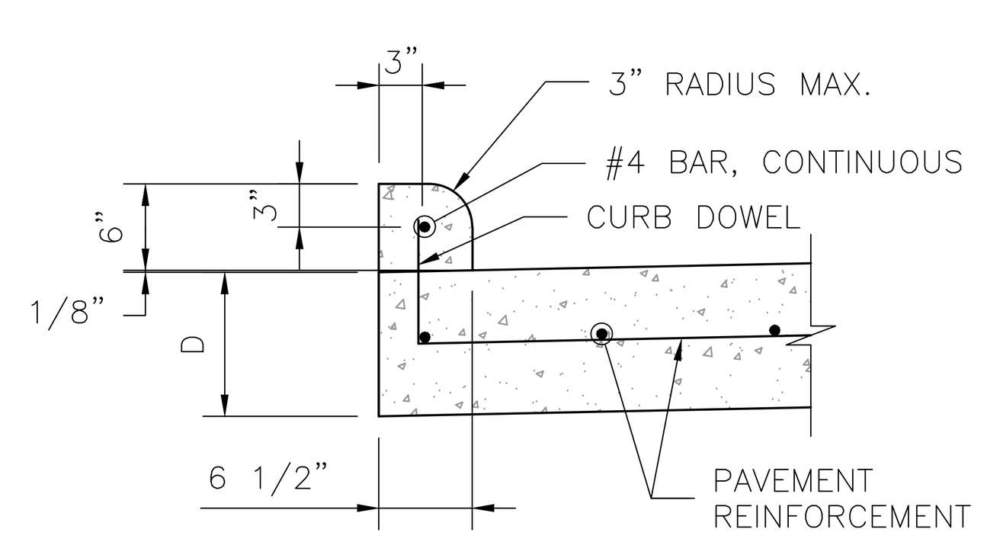
F.M. 306
EXISTING TYPICAL SECTION
N.T.S.



SLOTTED CURB DETAIL
N.T.S.

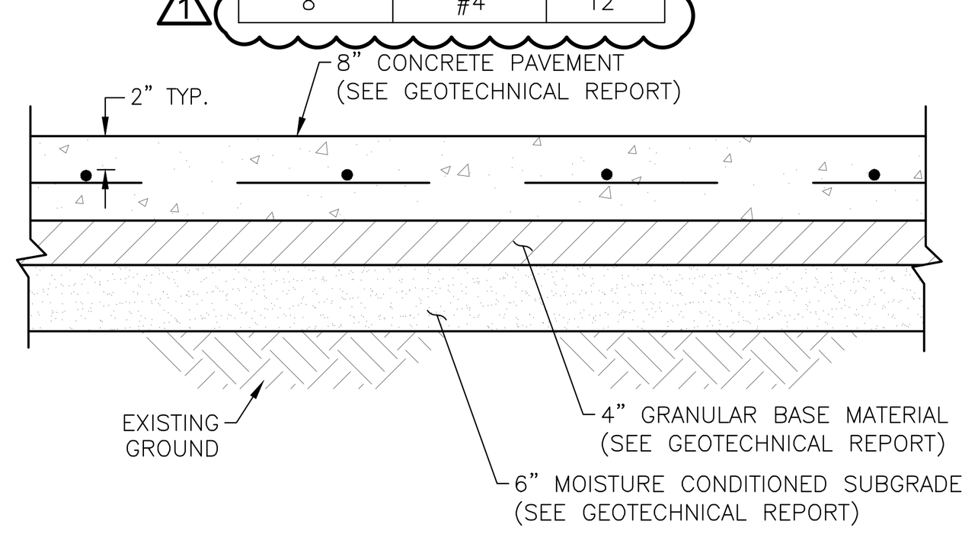


5.5" CONCRETE PAVEMENT SECTION
N.T.S.



CONCRETE CURB
REINFORCING DETAILS
N.T.S.

REINFORCING TABLE		
CONC. THK.	BAR	SPACING
5.5"	#3	18"
8"	#4	12"



8" CONCRETE PAVEMENT SECTION
N.T.S.

GENERAL NOTES:

ROADWAY WIDENING FOR DECELERATION LANE, STREET OR DRIVEWAYS WILL COMPLY WITH TxDOT SPECIFICATION ITEM NO. 112, 132, 316, 340,341, 360 AND 530.

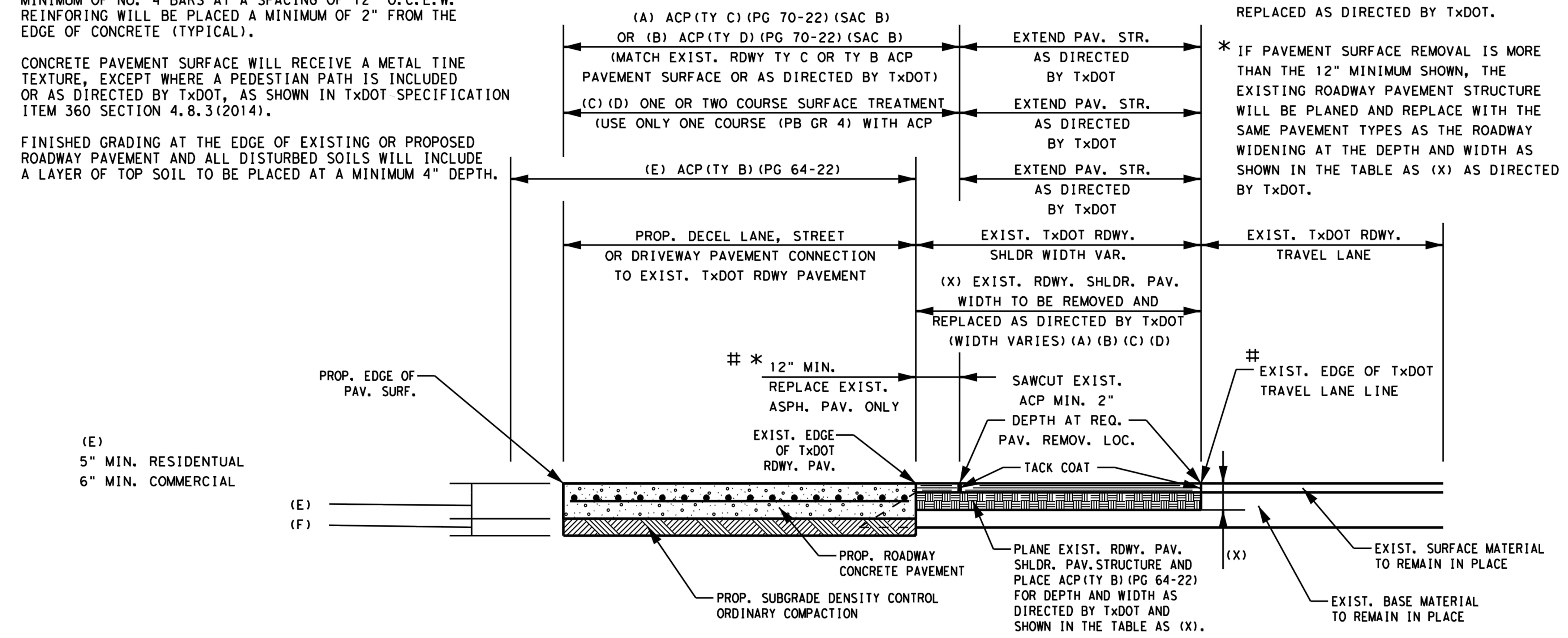
CONCRETE PAVEMENT WILL INCLUDE REINFORING USING A MINIMUM OF No. 4 BARS AT A SPACING OF 12" O.C.E.W. REINFORING WILL BE PLACED A MINIMUM OF 2" FROM THE EDGE OF CONCRETE (TYPICAL).

CONCRETE PAVEMENT SURFACE WILL RECEIVE A METAL TINE TEXTURE, EXCEPT WHERE A PEDESTIAN PATH IS INCLUDED OR AS DIRECTED BY TxDOT, AS SHOWN IN TxDOT SPECIFICATION ITEM 360 SECTION 4.8.3(2014).

FINISHED GRADING AT THE EDGE OF EXISTING OR PROPOSED ROADWAY PAVEMENT AND ALL DISTURBED SOILS WILL INCLUDE A LAYER OF TOP SOIL TO BE PLACED AT A MINIMUM 4" DEPTH.

\# IF FINAL PAVEMENT SURFACE IS TO BE 2 COURSE SURFACE TREATMENT THE TOP SURFACE COURSE WILL EXTEND A MAXIMIMU 6" BEYOND THE SAW CUT LINE. EXISTING PAVEMENT MARKINGS COVERED BY THE SEAL COAT WILL BE REPLACED AS DIRECTED BY TxDOT.

* IF PAVEMENT SURFACE REMOVAL IS MORE THAN THE 12" MINIMUM SHOWN, THE EXISTING ROADWAY PAVEMENT STRUCTURE WILL BE PLANED AND REPLACE WITH THE SAME PAVEMENT TYPES AS THE ROADWAY WIDENING AT THE DEPTH AND WIDTH AS SHOWN IN THE TABLE AS (X) AS DIRECTED BY TxDOT.



TYPICAL ROADWAY PAVEMENT SECTION

PAVEMENT STRUCTURE		
INDEX	WIDTH	DEPTH
(X) WIDTH OF EXIST. SHLDR TO BE REPLACED	12"	2"
(A) ACP(TY C)(PG 70-22)(SAC B)	***	——
(B) ACP(TY D)(PG 70-22)(SAC B)	***	2"
(C) SURFACE TREATMENT(PB, GR 3 OR 4)(SAC B)(TOP)	***	Y
(D) SURFACE TREATMENT(PB, GR 4)(SAC B)(BOTTOM)	***	——
(E) CONCRETE PAV. W/REINFORCING No. 4 BARS, 12" OCEW	***	8"
(F) COMPACTED SUBGRADE(ORDINARY COMPACTION)	***	8"

SURFACE TREATMENT PLACEMENT WILL SHOW ON THE TABLE ABOVE: "Y"=YES, "N"=NO
*** DIMENSIONS AS SHOWN ON THE VARIOUS PLAN SHEETS.

TYPICAL CONCRETE DRIVEWAY AND/OR DECELERATION LANE PAVEMENT CONNECTION TO EXISTING TxDOT ROADWAY PAVEMENT

DVO PROJECT - 182017

BROWN REYNOLDS WATFORD ARCHITECTS
2700 EARL RUDDER FRWY SOUTH
SUITE 4000
COLLEGE STATION, TEXAS 77845
979.694.1791
WWW.BRWARCH.COM

STATE OF TEXAS
JASON W. DAWSON
108125
LICENSED PROFESSIONAL ENGINEER
6-6-19

DVO
825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293-7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

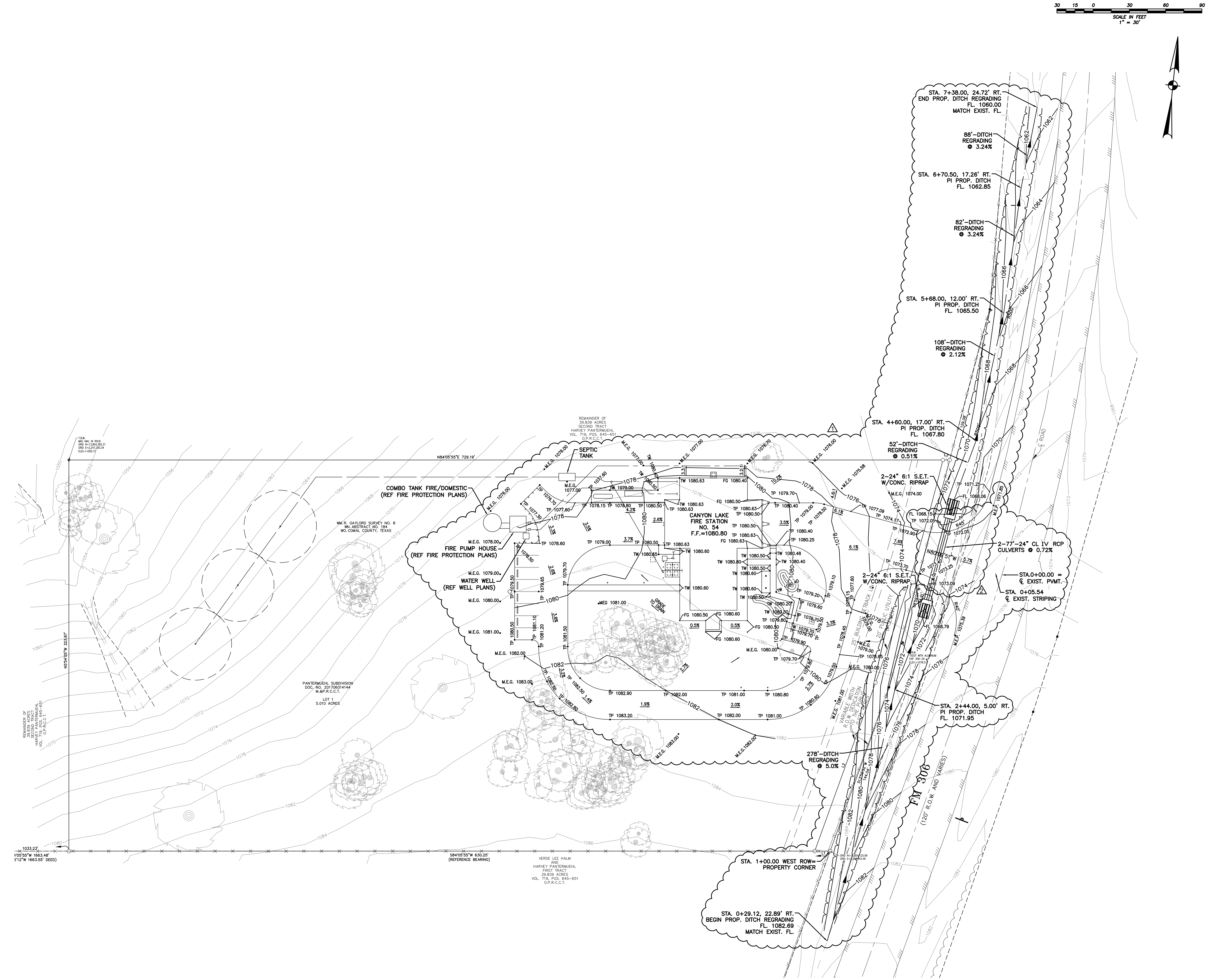
DATE	04/08/2019
DRAWN BY	
CHECKED BY	
BRW PROJECT NUMBER	218007.00

COMAL COUNTY ESD
FIRE AND EMS
STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

NO.	INI.	REVISION	DATE
1	JWD	POST BID ADDENDUM	06/06/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C4

PAVING PLAN



BENCHMARK:
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LEGEND

⊙	1/2" IRON ROD FOUND WITH PLASTIC CAP "URBAN CIVIL"
●	1/2" IRON PIN FOUND
▪	CORNER POST (SIZE NOTED)
⬡	TXDOT CONRETE MONUMENT TYPE 1
◉	MAG NAIL FOUND
M.&P.R.C.C.T.	MAP AND PLAT RECORDS COMAL COUNTY TEXAS
O.P.R.C.C.T.	OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS
R.O.W.	RIGHT–OF–WAY
	EDGE OF ASPHALT
	WIRE FENCE
	PUBLIC UTILITY EASEMENT
	BUILDING SETBACK LINE
	PROPOSED SWALE CENTERLINE
	PROPOSED TOP OF BANK
2.5%	PROPOSED GRADE
FF 1103.60	PROPOSED FINISHED FLOOR
FL 1101.00	PROPOSED FLOW LINE
FG 1101.00	PROPOSED FINISHED GRADE
G 1101.00	PROPOSED GUTTER
HB 1101.00	PROPOSED HIGH BANK
M.E.G. 1101.00	MATCH EXISTING GRADE
M.E.P. 1101.00	MATCH EXISTING PAVEMENT
TC 1101.00	PROPOSED TOP OF CURB
TP 1101.00	PROPOSED TOP OF PAVEMENT

GENERAL CONSTRUCTION NOTES:

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DVO PROJECT – 182017

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2700 EARL RUDDER FRWY SOUTH
SUITE 4000
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WWW.BRWARCH.COM

STATE OF TEXAS
JASON W. DAWSON
108125
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6-6-19

825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293-7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

DATE	04/08/2019
DRAWN BY	
CHECKED BY	
BRW PROJECT NUMBER	218007.00

COMAL COUNTY ESD FIRE AND EMS STATION 54

8685 FM 306
NEW BRAUNFELS, TEXAS 78133

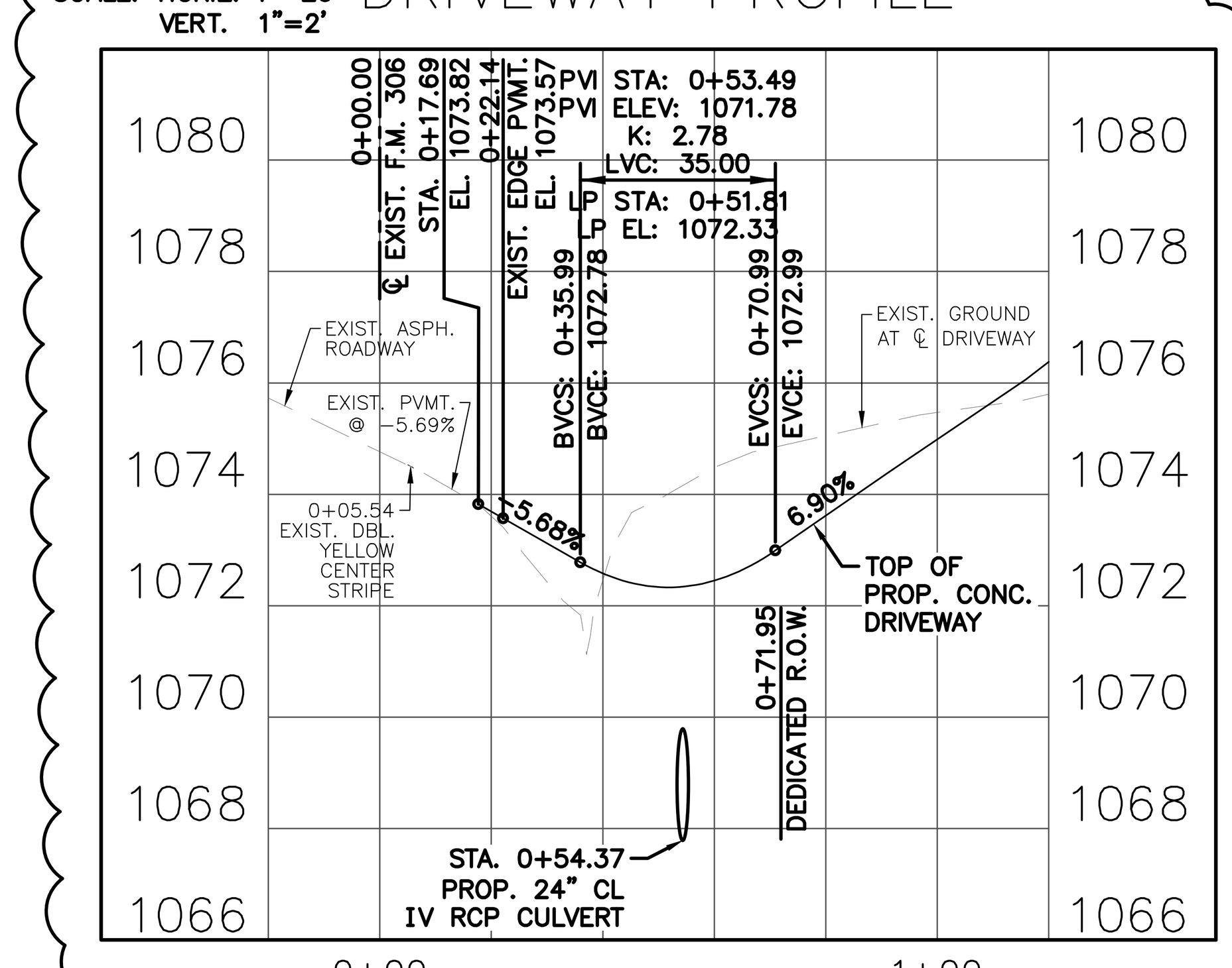
NO.	INI.	REVISION	DATE
1	JWD	POST BID ADDENDUM	06/06/19
2	JWD	PERMIT REVISIONS	07/12/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C5

GRADING AND DRAINAGE PLAN

SCALE: HORIZ. 1"=20'
VERT. 1"=2'

DRIVEWAY PROFILE



VERT. CURVE DATA

STA.	NORTH ELEV.	CL ELEV.	SOUTH ELEV.
0+35.99	1071.67	1072.78	1074.14
0+40.00	1071.77	1072.58	1073.88
0+50.00	1071.97	1072.34	1073.42
0+60.00	1072.31	1072.45	1073.33
0+70.99	1072.81	1072.99	1073.55

△2

BENCHMARK:
ALUMINUM TXDOT DISK LOCATED AT THE NORTHERN EAST CORNER OF THE INTERSECTION OF F.M. 306 AND HOFFMAN LANE.
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GRID N=13,838,059.68, GRID E=2,252,182.89
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LEGEND

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●	1/2" IRON PIN FOUND
▪	CORNER POST (SIZE NOTED)
⊙	TXDOT CONRETE MONUMENT TYPE 1
◉	MAG NAIL FOUND
M.&P.R.C.C.T.	MAP AND PLAT RECORDS COMAL COUNTY TEXAS
O.P.R.C.C.T.	OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS
R.O.W.	RIGHT-OF-WAY
////	EDGE OF ASPHALT
—x—x—	WIRE FENCE
— — —	PUBLIC UTILITY EASEMENT
—— ——	BUILDING SETBACK LINE
—·—►	PROPOSED SWALE CENTERLINE
∨∨∨	PROPOSED TOP OF BANK
2.5%	PROPOSED GRADE
FF 1103.60	PROPOSED FINISHED FLOOR
FL 1101.00	PROPOSED FLOW LINE
FG 1101.00	PROPOSED FINISHED GRADE
G 1101.00	PROPOSED GUTTER
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M.E.G. 1101.00	MATCH EXISTING GRADE
M.E.P. 1101.00	MATCH EXISTING PAVEMENT
TC 1101.00	PROPOSED TOP OF CURB
TP 1101.00	PROPOSED TOP OF PAVEMENT

GENERAL CONSTRUCTION NOTES:

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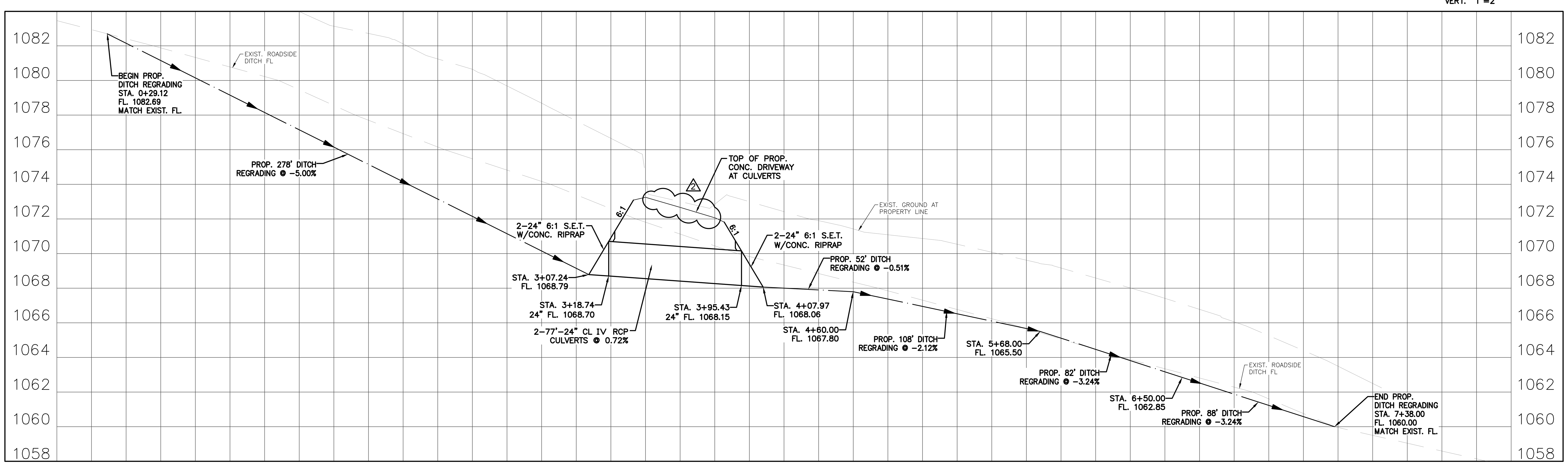
5. ALL DIMENSIONS ARE TO EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.

△1

CULVERT PROFILE

SCALE: HORIZ. 1"=20'
VERT. 1"=2'



DVO PROJECT – 182017

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DATE	04/08/2019
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BRW PROJECT NUMBER	218007.00

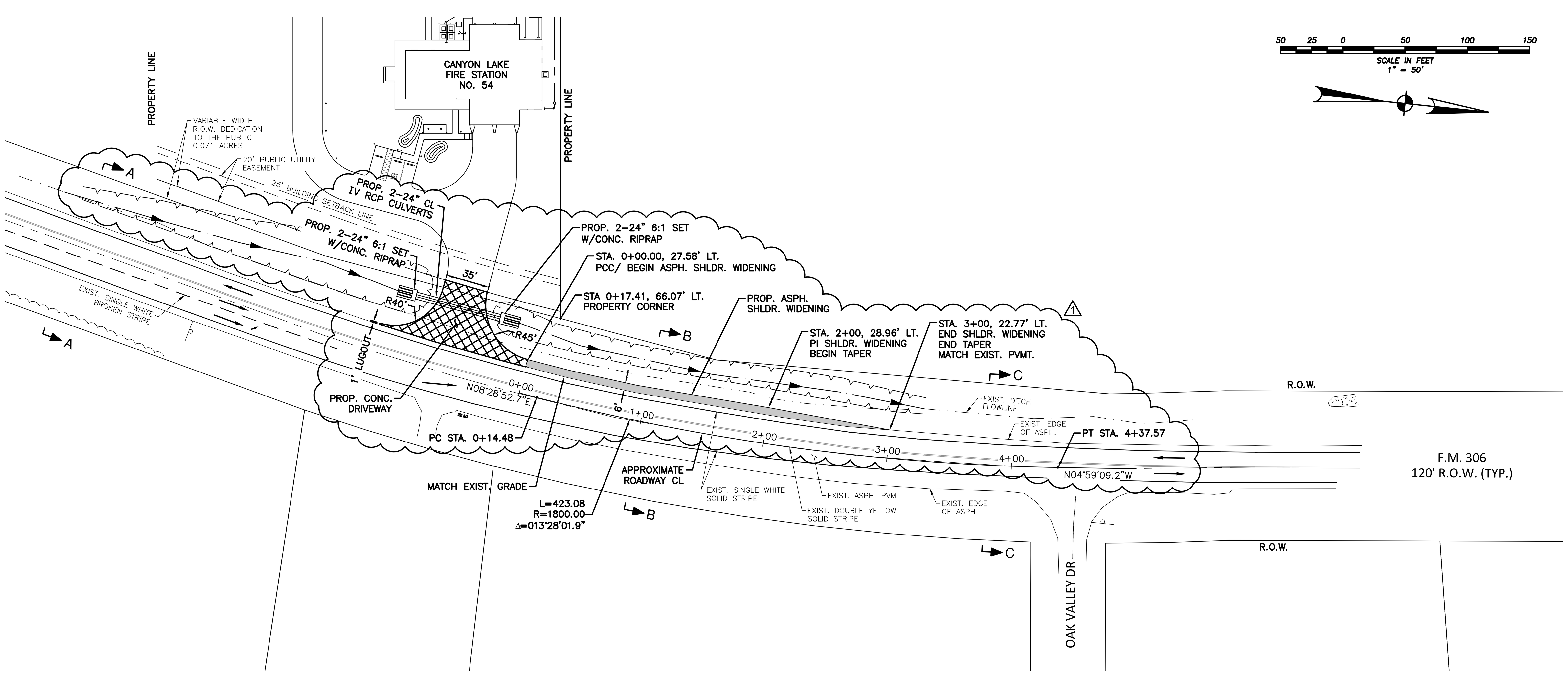
CANYON LAKE FIRE / EMS EST 1964

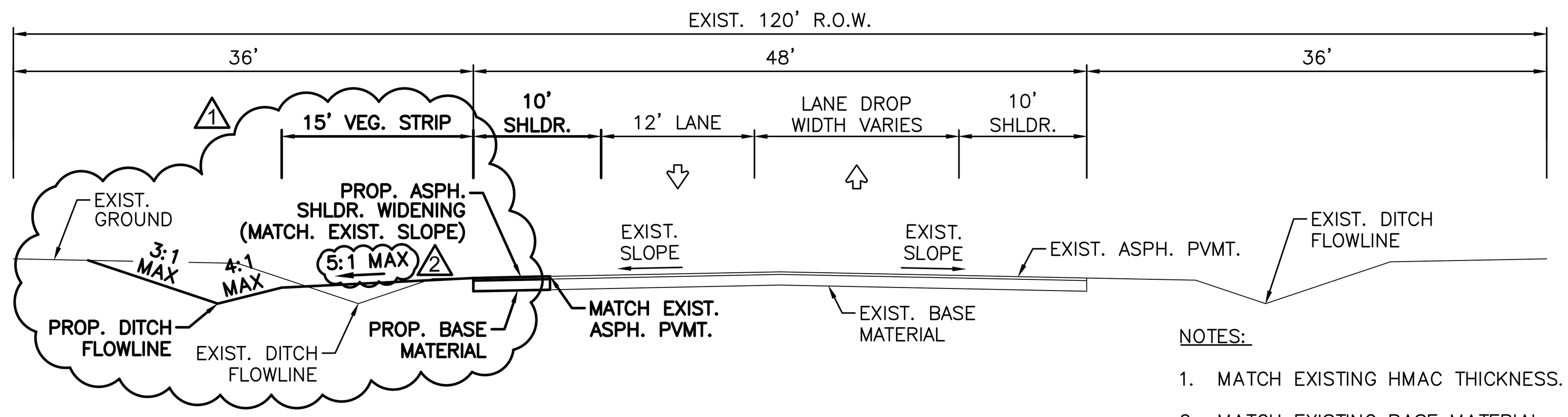
COMAL COUNTY ESD FIRE AND EMS STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

NO.	INI.	REVISION	DATE
△1	JWD	POST BID ADDENDUM	06/06/19
△2	JWD	PERMIT REVISIONS	07/12/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C6

DRIVEWAY AND DITCH PROFILES



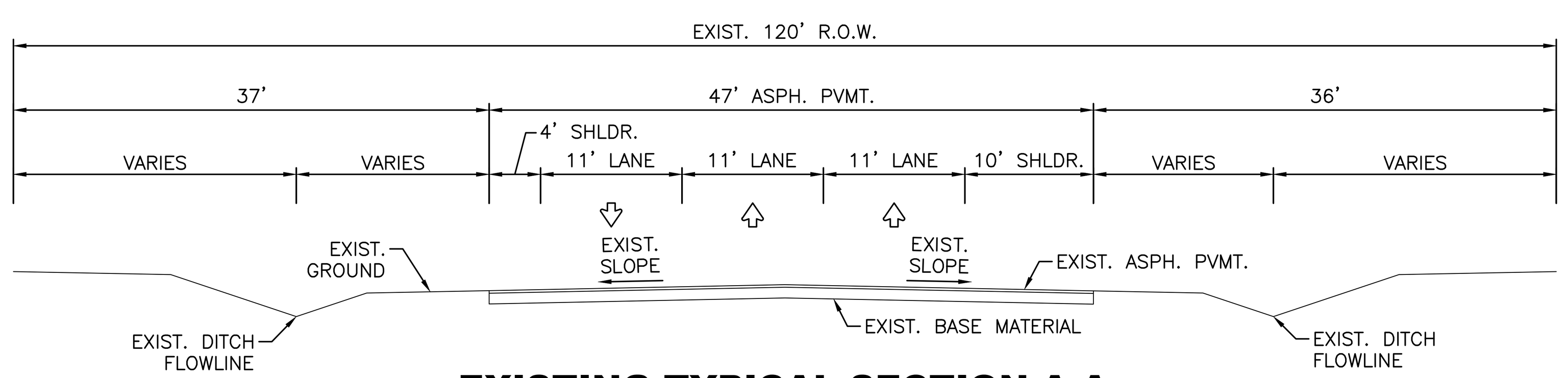


NOTES:

1. MATCH EXISTING HMAC THICKNESS.
2. MATCH EXISTING BASE MATERIAL AND THICKNESS.
3. EXISTING DITCH TO BE DEMUCKED AND BACKFILLED IN 8" LOOSE LIFTS AND COMPACTED TO 95% STANDARD PROCTOR DENSITY MEAN OPTIMUM MOISTURE CONTENT.

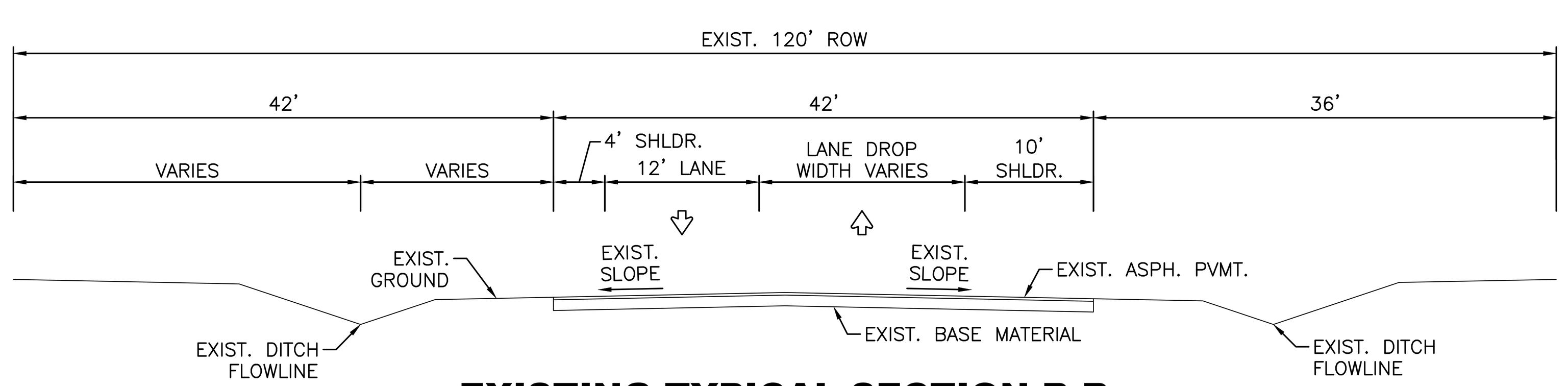
PROPOSED SHOULDER WIDENING TYPICAL SECTION B-B

NTS



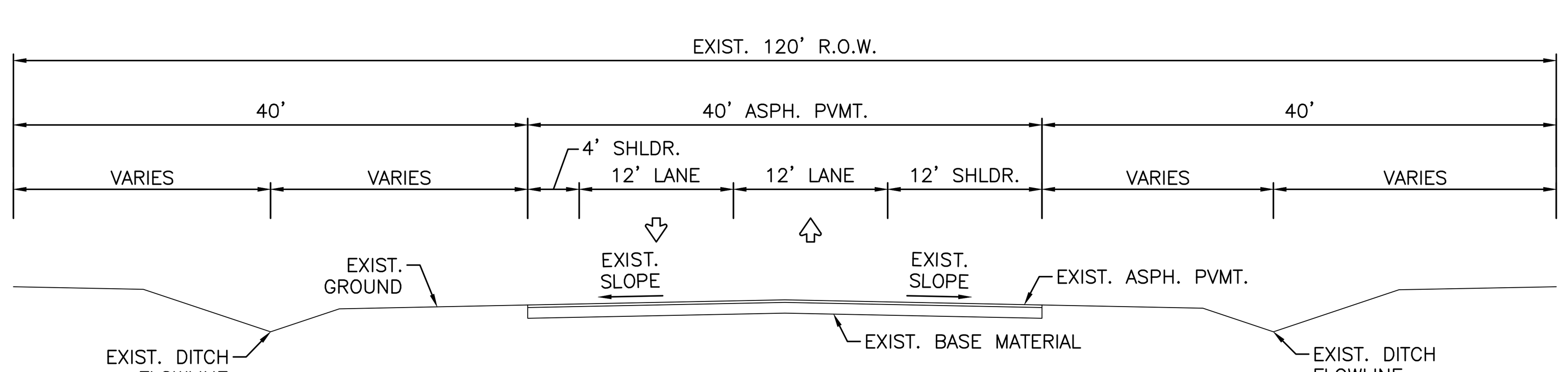
EXISTING TYPICAL SECTION A-A

NTS



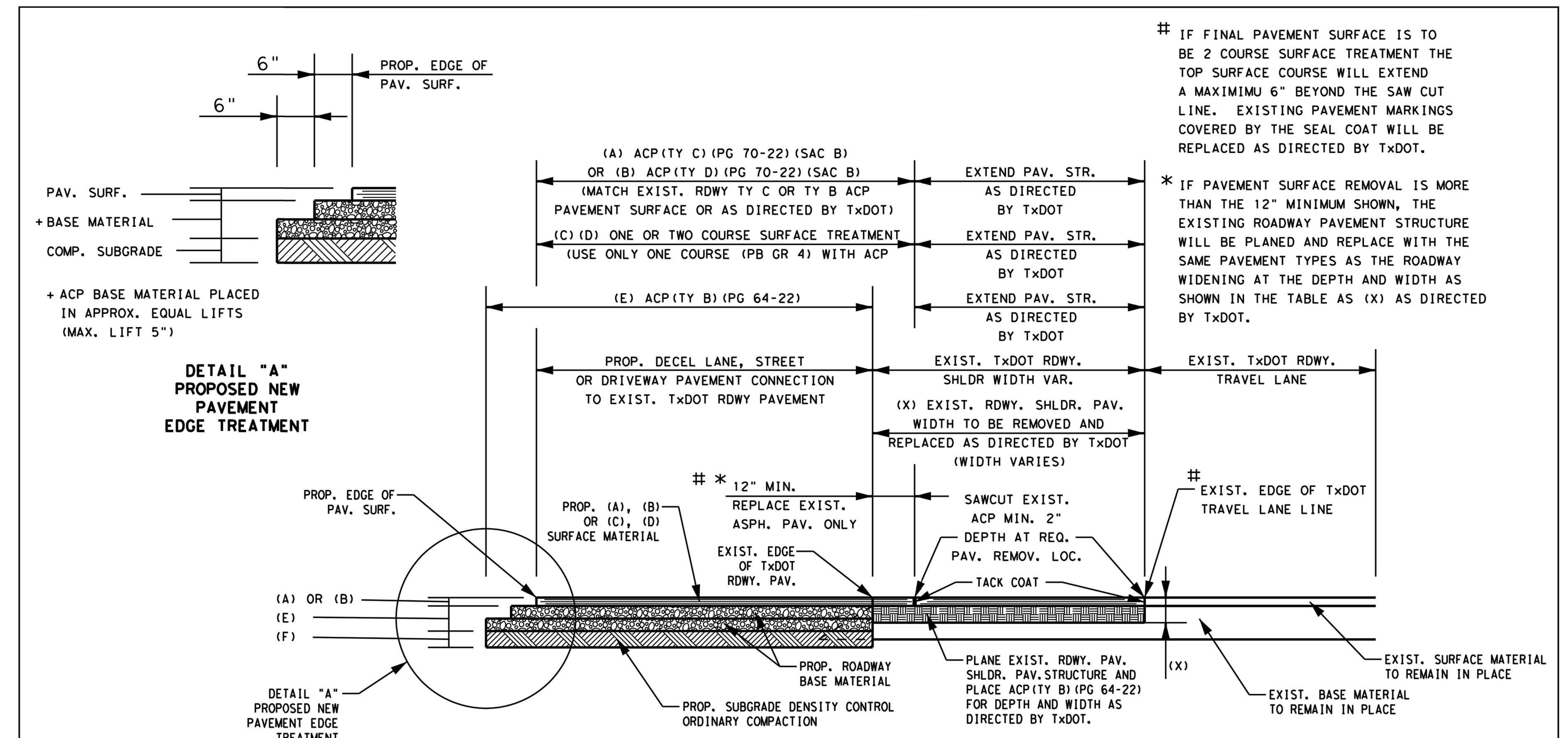
EXISTING TYPICAL SECTION B-B

NTS



EXISTING TYPICAL SECTION C-C

NTS



IF FINAL PAVEMENT SURFACE IS TO BE 2 COURSE SURFACE TREATMENT THE TOP SURFACE COURSE WILL EXTEND A MAXIMIMU 6" BEYOND THE SAW CUT LINE. EXISTING PAVEMENT MARKINGS COVERED BY THE SEAL COAT WILL BE REPLACED AS DIRECTED BY TxDOT.

* IF PAVEMENT SURFACE REMOVAL IS MORE THAN THE 12" MINIMUM SHOWN, THE EXISTING ROADWAY PAVEMENT STRUCTURE WILL BE PLANED AND REPLACE WITH THE SAME PAVEMENT TYPES AS THE ROADWAY WIDENING AT THE DEPTH AND WIDTH AS SHOWN IN THE TABLE AS (X) AS DIRECTED BY TxDOT.

TYPICAL ROADWAY PAVEMENT SECTION

PAVEMENT STRUCTURE

INDEX	WIDTH	DEPTH
(X) WIDTH OF EXIST. SHLDR TO BE REPLACED	12"	2"
(A) ACP (TY C) (PG 70-22) (SAC B)	***	——
(B) ACP (TY D) (PG 70-22) (SAC B)	***	2"
(C) SURFACE TREATMENT (PB, GR 3 OR 4) (SAC B) (TOP)	***	Y
(D) SURFACE TREATMENT (PB, GR 4) (SAC B) (BOTTOM)	***	——
(E) ACP (TY B) (PG 64-22) (MAX. 5" LIFT)	***	7"
(F) COMPACTED SUBGRADE (ORDINARY COMPACTION)	***	8"

SURFACE TREATMENT PLACEMENT WILL SHOW ON THE TABLE ABOVE: "Y"=YES, "N"=NO
*** DIMENSIONS AS SHOWN ON THE VARIOUS PLAN SHEETS.

GENERAL NOTES:
ROADWAY WIDENING FOR DECELERATION LANE, STREET OR DRIVEWAYS WILL COMPLY WITH TxDOT SPECIFICATION ITEM NO. 112, 132, 316, 340, 341 AND 530.

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TYPICAL ASPHALT DRIVEWAY AND/OR DECELERATION LANE PAVEMENT CONNECTION TO EXISTING TxDOT ROADWAY PAVEMENT

BENCHMARK:
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(SCALE FACTOR OF 1.00014 FOR SURFACE ADJ.)

FLOODPLAIN:
THIS TRACT IS LOCATED IN UNSHADED ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS SHOWN ON FLOOD INSURANCE RATE MAP FOR COMAL COUNTY, TEXAS COMMUNITY PANEL NUMBER 48091C0280F, EFFECTIVE DATE SEPTEMBER 2, 2009 AS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

LEGEND

⊙	1/2" IRON ROD FOUND WITH PLASTIC CAP "URBAN CIVIL"
●	1/2" IRON PIN FOUND
▪	CORNER POST (SIZE NOTED)
⬡	TXDOT CONRETE MONUMENT TYPE 1
◉	MAG NAIL FOUND
M.&P.R.C.C.T.	MAP AND PLAT RECORDS COMAL COUNTY TEXAS
O.P.R.C.C.T.	OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS
R.O.W.	RIGHT-OF-WAY
——//// ——	EDGE OF ASPHALT
——×——×——	WIRE FENCE
— — — —	PUBLIC UTILITY EASEMENT
——— ———	BUILDING SETBACK LINE
←	DIRECTION OF TRAVEL
(grey fill)	PROPOSED ASPHALT PAVEMENT
(crosshatch)	8" CONCRETE PAVEMENT (SEE GEOTECHNICAL REPORT)

GENERAL CONSTRUCTION NOTES:

1. EXISTING CONDITIONS AND UNDERGROUND UTILITIES SHOWN ON PLANS ARE NOT GUARANTEED TO BE COMPLETE OR DEFINITE, BUT WERE OBTAINED FROM THE BEST INFORMATION AVAILABLE.
2. CONTRACTOR TO VERIFY ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION.
3. THE LOCATION OF ALL UTILITIES PRESENTED ON THESE DRAWINGS IS SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
4. CONTRACTOR TO OBTAIN ALL PERMITS AND APPROVALS REQUIRED PRIOR TO STARTING CONSTRUCTION.
5. ALL DIMENSIONS ARE TO EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
6. CONTRACTOR TO GRADE TO NATURAL GROUND AT A MAXIMUM SLOPE OF 3:1.
7. CONTRACTOR TO GRADE TO DRAIN AT A MAXIMUM SLOPE OF 3:1.
8. CONTRACTOR TO VERIFY THAT ALL ADA AREAS COMPLY WITH MAXIMUM CROSS SLOPES OF 2%, AND MAXIMUM RUN SLOPES OF 5%.

PAVEMENT NOTES:

1. REFER TO GEOTECHNICAL REPORT PREPARED BY TERRACON, PROJECT NO. 90185283 FOR ADDITIONAL INFORMATION.

DVO PROJECT – 182017

BROWN REYNOLDS WATFORD ARCHITECTS
2700 EARL RUDDER FRWY SOUTH
SUITE 4000
COLLEGE STATION, TEXAS 77845
979-694-1791
WWW.BRWARCH.COM

STATE OF TEXAS
JASON W. DAWSON
108125
LICENSED PROFESSIONAL ENGINEER
6-6-19

825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293-7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

DATE 04/08/2019
DRAWN BY
CHECKED BY
BRW PROJECT NUMBER 218007.00

COMAL COUNTY ESD FIRE AND EMS STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

NO.	INI.	REVISION	DATE
1	JWD	POST BID ADDENDUM	06/06/19
2	JWD	PERMIT REVISIONS	07/12/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

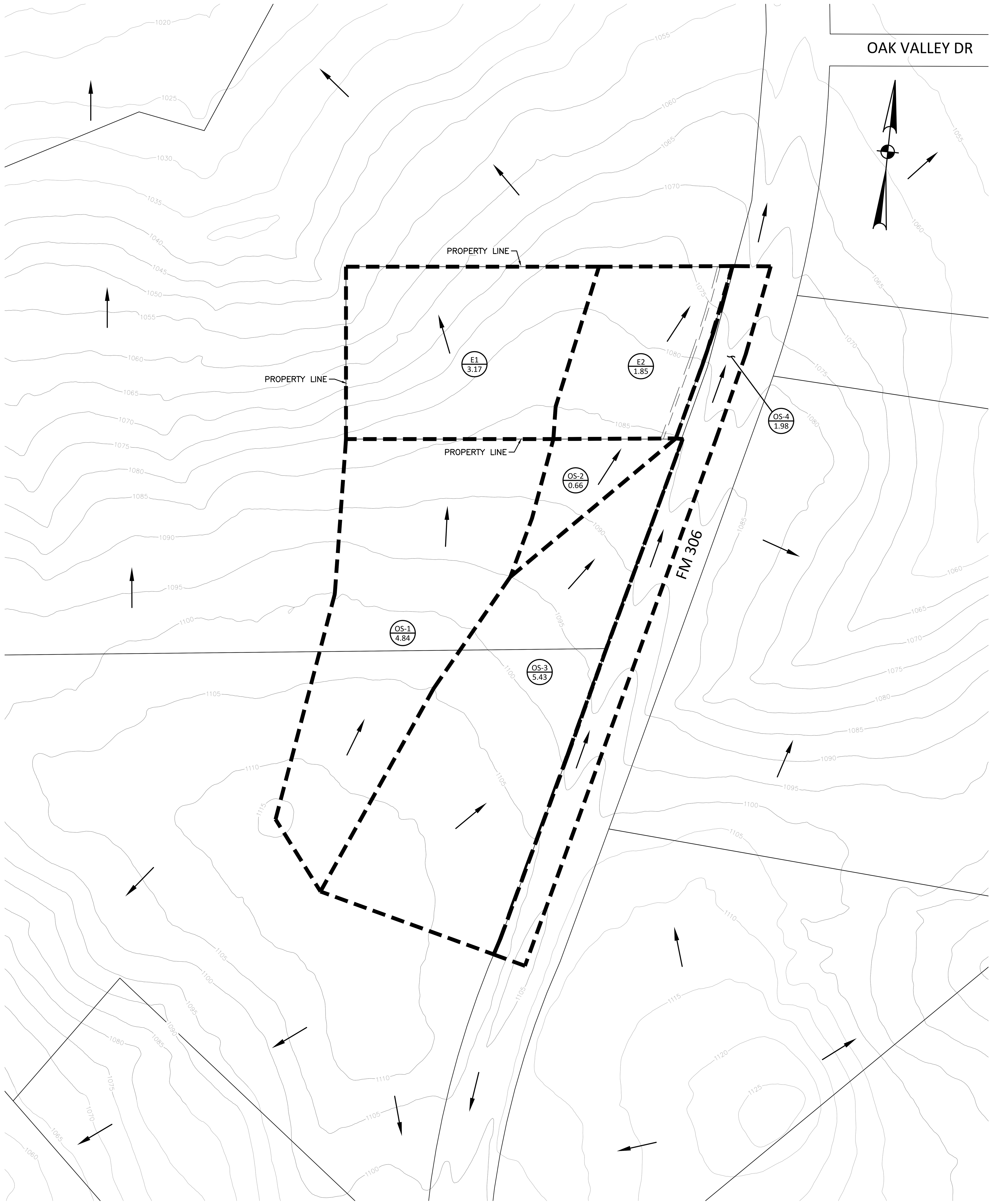
C7

F.M. 306
SHOULDER WIDENING

SCALE IN FEET 1" = 30' (30 15 0 30 60 90)

BENCHMARK:
ALUMINUM TXDOT DISK LOCATED AT THE NORTHERN EAST CORNER OF THE INTERSECTION OF F.M. 306 AND HOFFMAN LANE.
ELEV.=932.76, [PUBLISHED ELEV.=932.73']
GRID N=13,838,059.68, GRID E=2,252,182.89
(SCALE FACTOR OF 1.00014 FOR SURFACE ADJ.)

FLOODPLAIN:
THIS TRACT IS LOCATED IN UNSHADED ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS SHOWN ON FLOOD INSURANCE RATE MAP FOR COMAL COUNTY, TEXAS COMMUNITY PANEL NUMBER 48091C0280F, EFFECTIVE DATE SEPTEMBER 2, 2009 AS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.



Rainfall Intensity-Duration-Frequency Coefficients for Texas

Based on United States Geological Survey (USGS) Scientific Investigations Report 2004–5041
"Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas"

1. Select English or SI Units: English
2. Select or Enter a County: Comal
3. Enter a Time of Conc. Select Units: 10 min

Coefficient	50% (2-year)	20% (5-year)	10% (10-year)	4% (25-year)	2% (50-year)	1% (100-year)
e	0.8305	0.8168	0.816	0.81	0.8111	0.8129
b (in.)	62.99	78.06	92.64	108.83	128.59	150.24
d (min)	11.85	11.98	12.79	12.97	13.77	14.82
Intensity (in./hr)	4.86	6.26	7.23	8.59	9.84	11.04

(Spreadsheet Release Date: August 31, 2015; data table reshuffle by Asquith July 14, 2016)

LEGEND

SYMBOL	DESCRIPTION
A1 / X.XX	DRAINAGE AREA DESIGNATION / DRAINAGE AREA (ACRES)
X.XX / X.XX	10-YEAR FLOW (C.F.S.) / 100-YEAR FLOW (C.F.S.)
— — —	DRAINAGE AREA BOUNDARY
——→	EXISTING DRAINAGE PATTERN

DRAINAGE NOTES:

1. EXISTING CONTOUR DATA OBTAINED FROM DATA AVAILABLE TO PUBLIC BY COMAL COUNTY WEBSITE.
2. TOPOGRAPHIC SURVEY OBTAINED WAS LIMITED TO THE PROJECT TRACT AND FRONTAGE ALONG PUBLIC RIGHT-OF-WAY.

△1

PROJECT SITE - EXISTING PEAK FLOW CALCULATIONS (Q = C*i*A)

DA Name	Area (AC)	Runoff Coefficient (C)	Q (2-year) (cfs)	Q (5-year) (cfs)	Q (10-year) (cfs)	Q (25-year) (cfs)	Q (50-year) (cfs)	Q (100-year) (cfs)
E1	3.17	0.49	7.55	9.72	11.23	13.34	15.28	17.15
E2	1.85	0.49	4.41	5.67	6.55	7.79	8.92	10.01
OS-1	4.84	0.49	11.53	14.85	17.15	20.37	23.34	26.18
OS-2	0.66	0.49	1.57	2.02	2.34	2.78	3.18	3.57
		TOTAL	**25.05**	**32.27**	**37.27**	**44.28**	**50.72**	**56.91**

ROADSITE DITCH - EXISTING PEAK FLOW CALCULATIONS (Q = C*i*A)

DA Name	Area (AC)	Runoff Coefficient (C)	Q (2-year) (cfs)	Q (5-year) (cfs)	Q (10-year) (cfs)	Q (25-year) (cfs)	Q (50-year) (cfs)	Q (100-year) (cfs)
E2	1.85	0.49	4.41	5.67	6.55	7.79	8.92	10.01
OS-2	0.66	0.49	1.57	2.02	2.34	2.78	3.18	3.57
OS-3	5.43	0.49	12.93	16.66	19.24	22.86	26.18	29.37
OS-4*	1.98	0.65	6.29	8.10	9.36	11.12	12.73	14.29
		TOTAL	**25.20**	**32.46**	**37.49**	**44.54**	**51.02**	**57.24**

*Weighed Runoff Coefficient

Intensity (i) (in/hr)		4.86	6.26	7.23	8.59	9.84	11.04

Intensity based on a minimum time of concentration of 10 minutes (TxDOT Hydraulic Design Manual)

		Runoff Coefficients (C)	Source:
C=	0.49	Existing Rural Watershed	City of Bulverde Storm Drainage Design Criteria Manual
C=	0.49	Existing Roadside Ditch (30' Wide)	City of Bulverde Storm Drainage Design Criteria Manual
C=	0.85	Existing Asphalt Road (25' Wide)	TxDOT Hydraulic Design Criteria
C=	0.90	Proposed Concrete Pavement	TxDOT Hydraulic Design Criteria

DVO PROJECT – 182017

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STATE OF TEXAS
JASON W. DAWSON
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DVO
825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293-7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

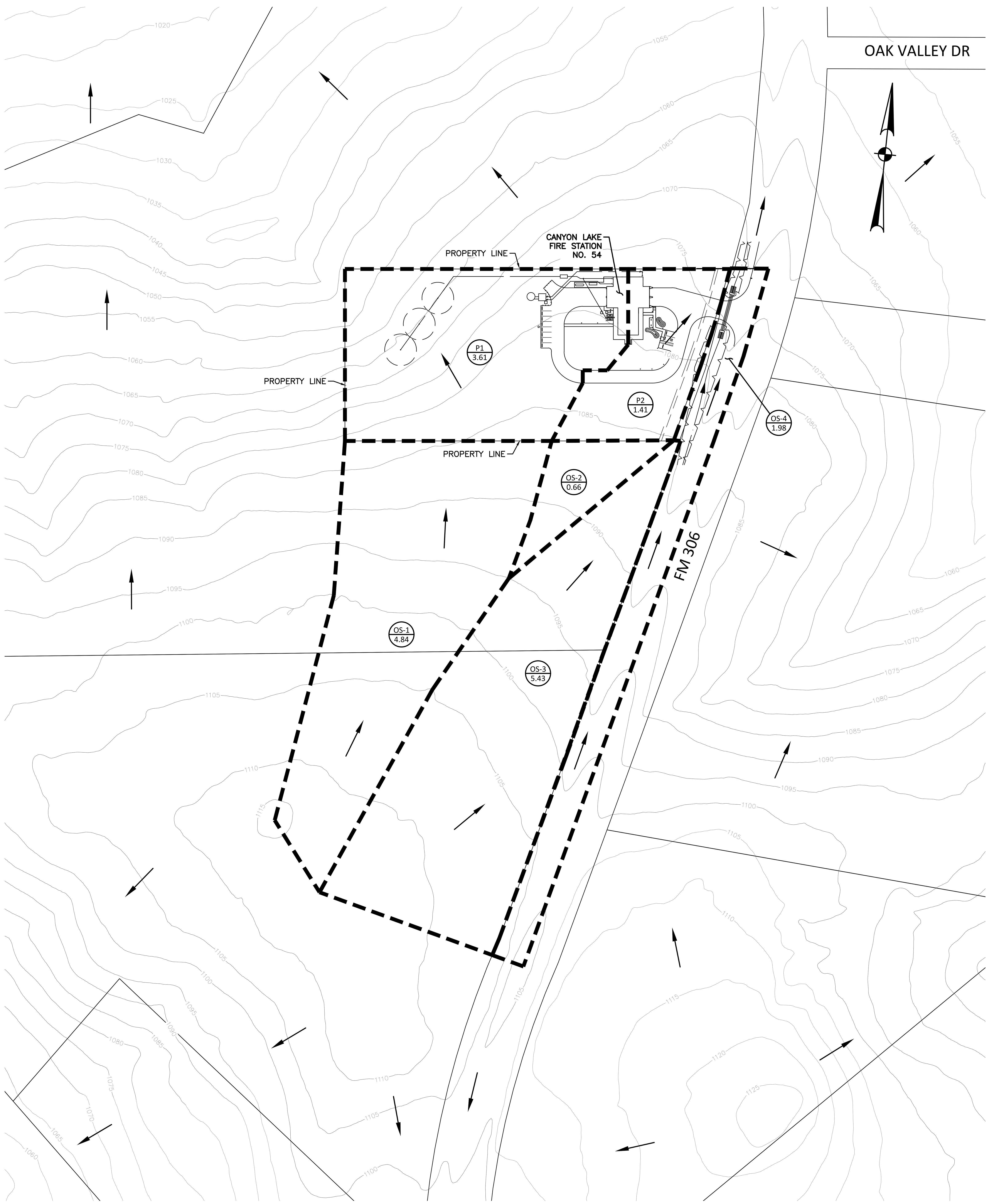
DATE 04/08/2019
DRAWN BY
CHECKED BY
BRW PROJECT NUMBER 218007.00

COMAL COUNTY ESD
FIRE AND EMS
STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

NO.	INI.	REVISION	DATE
△1	JWD	POST BID ADDENDUM	06/06/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C8

EXISTING DRAINAGE PLAN



30 15 0 30 60 90
SCALE IN FEET
1" = 30'

BENCHMARK:
ALUMINUM TXDOT DISK LOCATED AT THE NORTHERN EAST CORNER OF THE INTERSECTION OF F.M. 306 AND HOFFMAN LANE.
ELEV.=932.76, [PUBLISHED ELEV.=932.73']
GRID N=13,838,059.68, GRID E=2,252,182.89
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FLOODPLAIN:
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LEGEND

SYMBOL	DESCRIPTION
P1 / X.XX	DRAINAGE AREA DESIGNATION / DRAINAGE AREA (ACRES)
X.XX / X.XX	2-YEAR FLOW (C.F.S.) / 100-YEAR FLOW (C.F.S.)
(hatch)	TXDOT FRONTAGE DRAINAGE AREA (1.18 AC.)
(dashed line)	DRAINAGE AREA BOUNDARY
(arrow)	DRAINAGE PATTERN

DRAINAGE NOTES:

1. EXISTING CONTOUR DATA OBTAINED FROM DATA AVAILABLE TO PUBLIC BY COMAL COUNTY WEBSITE.
2. TOPOGRAPHIC SURVEY OBTAINED WAS LIMITED TO THE PROJECT TRACT AND FRONTAGE ALONG PUBLIC RIGHT-OF-WAY.

Rainfall Intensity-Duration-Frequency Coefficients for Texas

Based on United States Geological Survey (USGS) Scientific Investigations Report 2004–5041
"Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas"

1. Select English or SI Units: English
2. Select or Enter a County: Comal
3. Enter a Time of Conc. Select Units: 10 min

Coefficient	50% (2-year)	20% (5-year)	10% (10-year)	4% (25-year)	2% (50-year)	1% (100-year)
e	0.8305	0.8168	0.816	0.81	0.8111	0.8129
b (in.)	62.99	78.06	92.64	108.83	128.59	150.24
d (min)	11.85	11.98	12.79	12.97	13.77	14.82
Intensity (in./hr)	4.86	6.26	7.23	8.59	9.84	11.04

(Spreadsheet Release Date: August 31, 2015; data table reshuffle by Asquith July 14, 2016)

1

PROJECT SITE - PROPOSED PEAK FLOW CALCULATIONS (Q = C*i*A)

DA Name	Impervious Area (AC)	Total Area (AC)	Runoff Coefficient (C)	Q (2-year) (cfs)	Q (5-year) (cfs)	Q (10-year) (cfs)	Q (25-year) (cfs)	Q (50-year) (cfs)	Q (100-year) (cfs)
P1*	0.411	3.61	0.54	9.42	12.13	14.01	16.64	19.06	21.39
P2*	0.391	1.41	0.60	4.14	5.33	6.15	7.31	8.38	9.40
OS-1	0	4.84	0.49	11.53	14.85	17.15	20.37	23.34	26.18
OS-2	0	0.66	0.49	1.57	2.02	2.34	2.78	3.18	3.57
			TOTAL	**26.65**	**34.33**	**39.65**	**47.10**	**53.96**	**60.54**

*Weighed Runoff Coefficient

DRIVEWAY CULVERT - PROPOSED PEAK FLOW CALCULATIONS (Q = C*i*A)

DA Name	Impervious Area (AC)	Total Area (AC)	Runoff Coefficient (C)	Q (2-year) (cfs)	Q (5-year) (cfs)	Q (10-year) (cfs)	Q (25-year) (cfs)	Q (50-year) (cfs)	Q (100-year) (cfs)
P2*	0.391	1.41	0.60	4.14	5.33	6.15	7.31	8.38	9.40
OS-2	0	0.66	0.49	1.57	2.02	2.34	2.78	3.18	3.57
OS-3	0	5.43	0.49	12.93	16.66	19.24	22.86	26.18	29.37
OS-4*	1.002	1.98	0.67	6.47	8.33	9.62	11.43	13.10	14.69
			TOTAL	**25.11**	**32.34**	**37.35**	**44.38**	**50.84**	**57.04**

*Weighed Runoff Coefficient

Intensity (i) (in/hr)				4.86	6.26	7.23	8.59	9.84	11.04

Intensity based on a minimum time of concentration of 10 minutes (TxDOT Hydraulic Design Manual)

		Runoff Coefficients (C)	Source:
C=	0.49	Existing Rural Watershed	City of Bulverde Storm Drainage Design Criteria Manual
C=	0.49	Existing Roadside Ditch (30' Wide)	City of Bulverde Storm Drainage Design Criteria Manual
C=	0.85	Existing Asphalt Road (25' Wide)	TxDOT Hydraulic Design Criteria
C=	0.90	Proposed Concrete Pavement	TxDOT Hydraulic Design Criteria

Existing Runoff to TxDOT R.O.W from Site (Drainage Area E2)

AEP	50% (2-year)	20% (5-year)	10% (10-year)	4% (25-year)	2% (50-year)	1% (100-year)
C	0.49	0.49	0.49	0.49	0.49	0.49
I (in/hr)	4.86	6.26	7.23	8.59	9.84	11.04
A (acres)	1.85	1.85	1.85	1.85	1.85	1.85
Q_{exist} (cfs)	**4.41**	**5.67**	**6.55**	**7.79**	**8.92**	**10.01**

Proposed Runoff to TxDOT R.O.W from Site (Drainage Area P2)

AEP	50% (2-year)	20% (5-year)	10% (10-year)	4% (25-year)	2% (50-year)	1% (100-year)
C	**0.60**	**0.60**	**0.60**	**0.60**	**0.60**	**0.60**
I (in/hr)	4.86	6.26	7.23	8.59	9.84	11.04
A (acres)	1.41	1.41	1.41	1.41	1.41	1.41
Q_{prop} (cfs)	**4.11**	**5.30**	**6.12**	**7.27**	**8.32**	**9.34**

Used minimum time of concentration of 10 minutes (TxDOT Hydraulic Design Manual)
Intensity Values based on TxDOT IDF Data Sheet
AEP = Annual Exceedence Probability

DVO PROJECT – 182017

BROWN REYNOLDS WATFORD ARCHITECTS
2700 EARL RUDDER FRWY SOUTH
SUITE 4000
COLLEGE STATION, TEXAS 77845
979-694-1791
WWW.BRWARCH.COM

STATE OF TEXAS
JASON W. DAWSON
108125
LICENSED PROFESSIONAL ENGINEER
6-6-19

DVO
825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293-7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

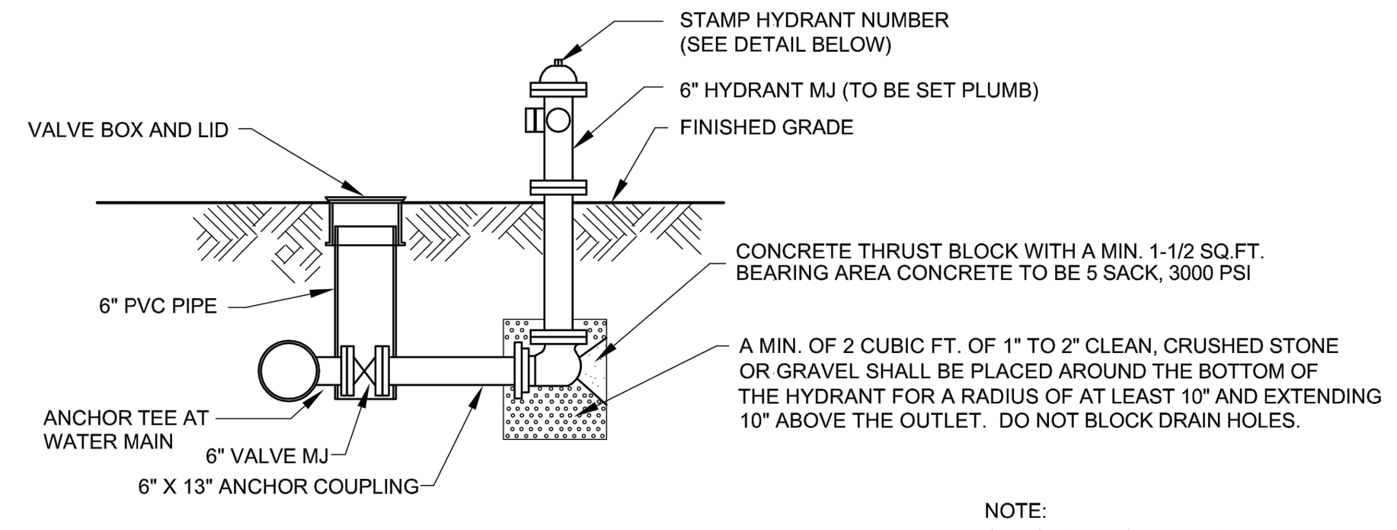
DATE	04/08/2019
DRAWN BY	
CHECKED BY	
BRW PROJECT NUMBER	218007.00

COMAL COUNTY ESD FIRE AND EMS STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

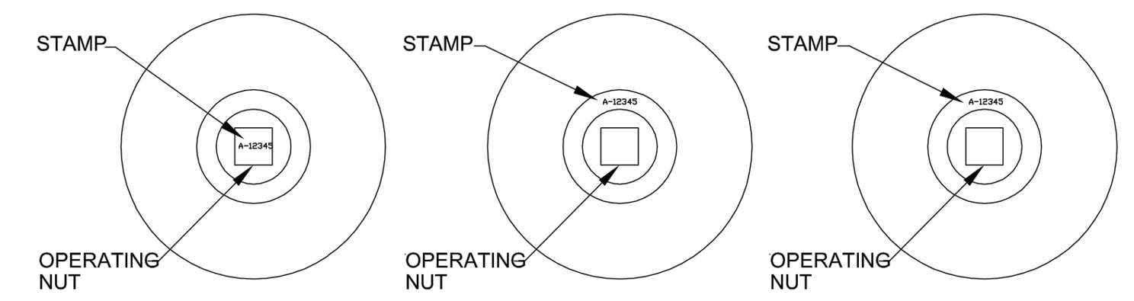
NO.	INI.	REVISION	DATE
1	JWD	POST BID ADDENDUM	06/06/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C9

PROPOSED DRAINAGE PLAN



NOTE:
SEE STD. DWG. MAIN-VB
FOR VALVE BOX INSTALLATION



DETAIL: HYDRANT NUMBER LOCATION
TOP VIEW

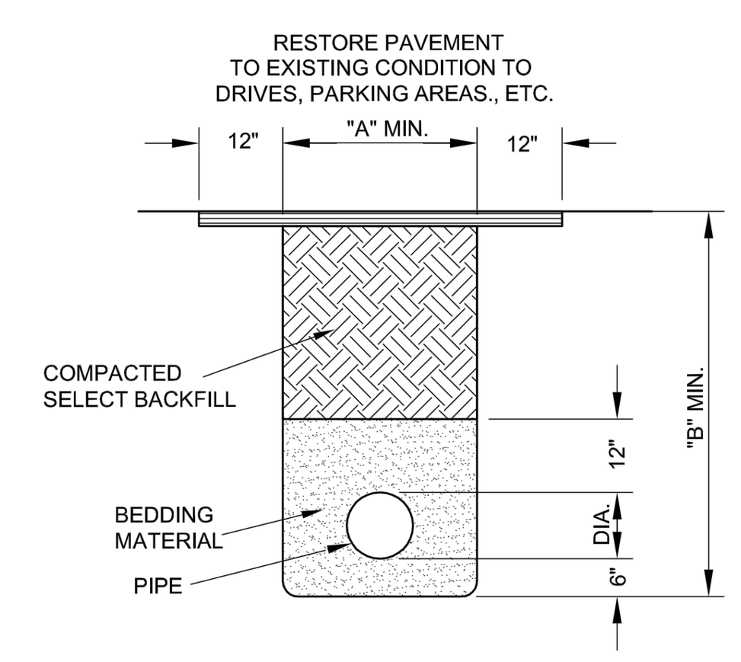
GENERAL NOTES:
(1) FOR ADDITIONAL INFORMATION, SEE CANYON LAKE WATER SERVICE COMPANY'S STANDARD SPECIFICATIONS.

BY	REVISION	DATE	CK	AP	OPS

CLWSC
CANYON LAKE WATER SERVICE COMPANY
1399 Sattler Road
Canyon Lake, Texas 78133
(830) 964-3854

STANDARD HYDRANT INSTALLATION
BY: JW / M.HOMER — OPERATIONS / DATE
DATE: 02-11-09 — ENGINEERING / DATE
CK:
SCALE: NONE — DIRECTOR OF ENGINEERING / DATE
REF. NOS.
DWG. NO. MAIN-HYD
SHEET: 1 OF 1

PIPE DIA.	WIDTH "A"	DEPTH "B"
4"	16"	36"
6"	24"	40"
8"	24"	44"
12"	30"	52"
16"	36"	56"
>16"	DIA.+ 24"	DIA.+ 40"



NOTES:

1. SEE CLWSC STANDARD SPECIFICATIONS FOR NOTES CONCERNING BEDDING AND COMPACTION.

2. ALL TRENCHES UNDER OR WITHIN 5 FEET OF PAVEMENT OR STRUCTURES TO BE FILLED IN MAXIMUM 8-INCH LIFTS COMPACTED TO 95% STANDARD PROCTOR DENSITY. TRENCHES IN OTHER AREAS ARE TO BE COMPACTED TO THE DENSITY OF THE ADJACENT UNDISTURBED SOIL.

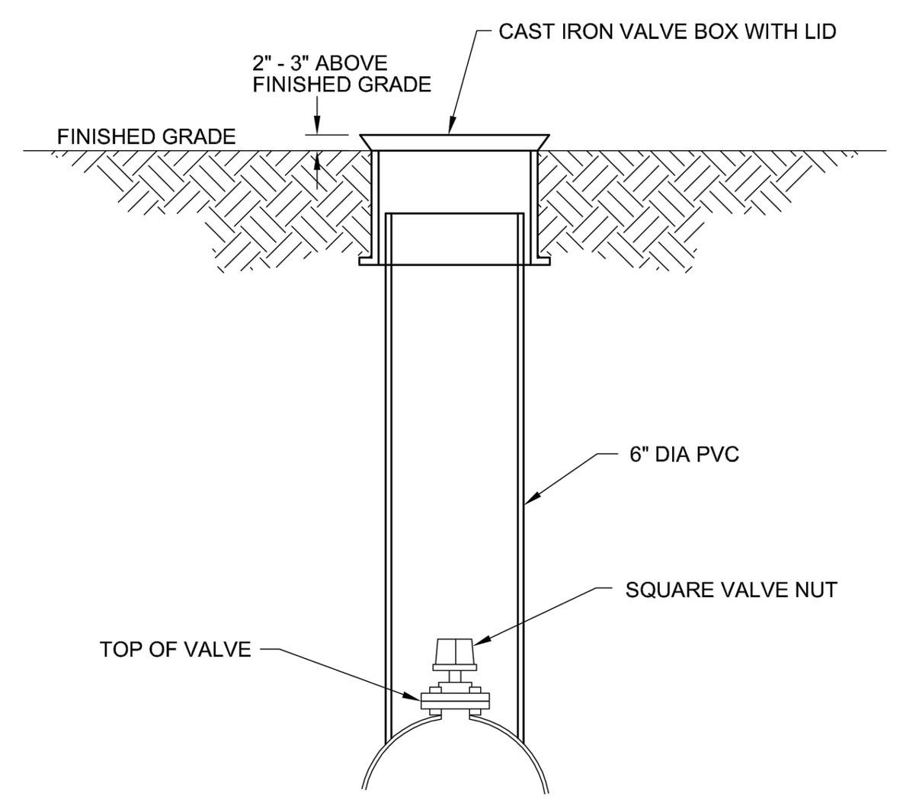
3. SEE STANDARD DETAIL "MAIN-CC" FOR CONCRETE CAP OVER SHALLOW PIPE.

GENERAL NOTES:

BY	REVISION	DATE	CK	AP	OPS

CLWSC
CANYON LAKE WATER SERVICE COMPANY
1399 Sattler Road
Canyon Lake, Texas 78133
(830) 964-3854

TYPICAL TRENCH DETAIL
BY: M.HOMER — OPERATIONS / DATE
DATE: 07 Dec 17 — ENGINEERING / DATE
CK:
SCALE: NONE — DIRECTOR OF ENGINEERING / DATE
REF. NOS.
DWG. NO. MAIN-TRN
SHEET: 1 OF 1

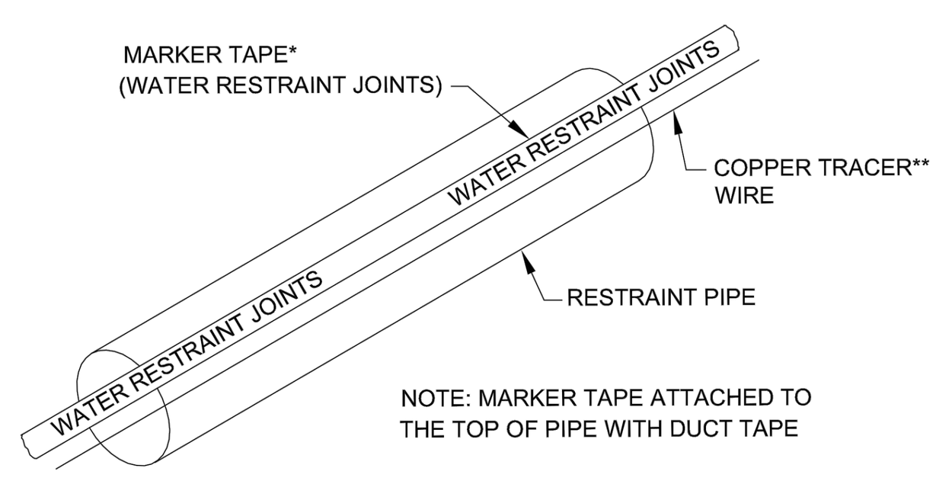


GENERAL NOTES:
(1) FOR ADDITIONAL INFORMATION, SEE CANYON LAKE WATER SERVICE COMPANY'S STANDARD SPECIFICATIONS.

BY	REVISION	DATE	CK	AP	OPS

CLWSC
CANYON LAKE WATER SERVICE COMPANY
1399 Sattler Road
Canyon Lake, Texas 78133
(830) 964-3854

VALVE BOX INSTALLATION
BY: JW / M.HOMER — OPERATIONS / DATE
DATE: 02-11-09 — ENGINEERING / DATE
CK:
SCALE: NONE — DIRECTOR OF ENGINEERING / DATE
REF. NOS.
DWG. NO. MAIN-VB
SHEET: 1 OF 1



NOTE: MARKER TAPE ATTACHED TO THE TOP OF PIPE WITH DUCT TAPE

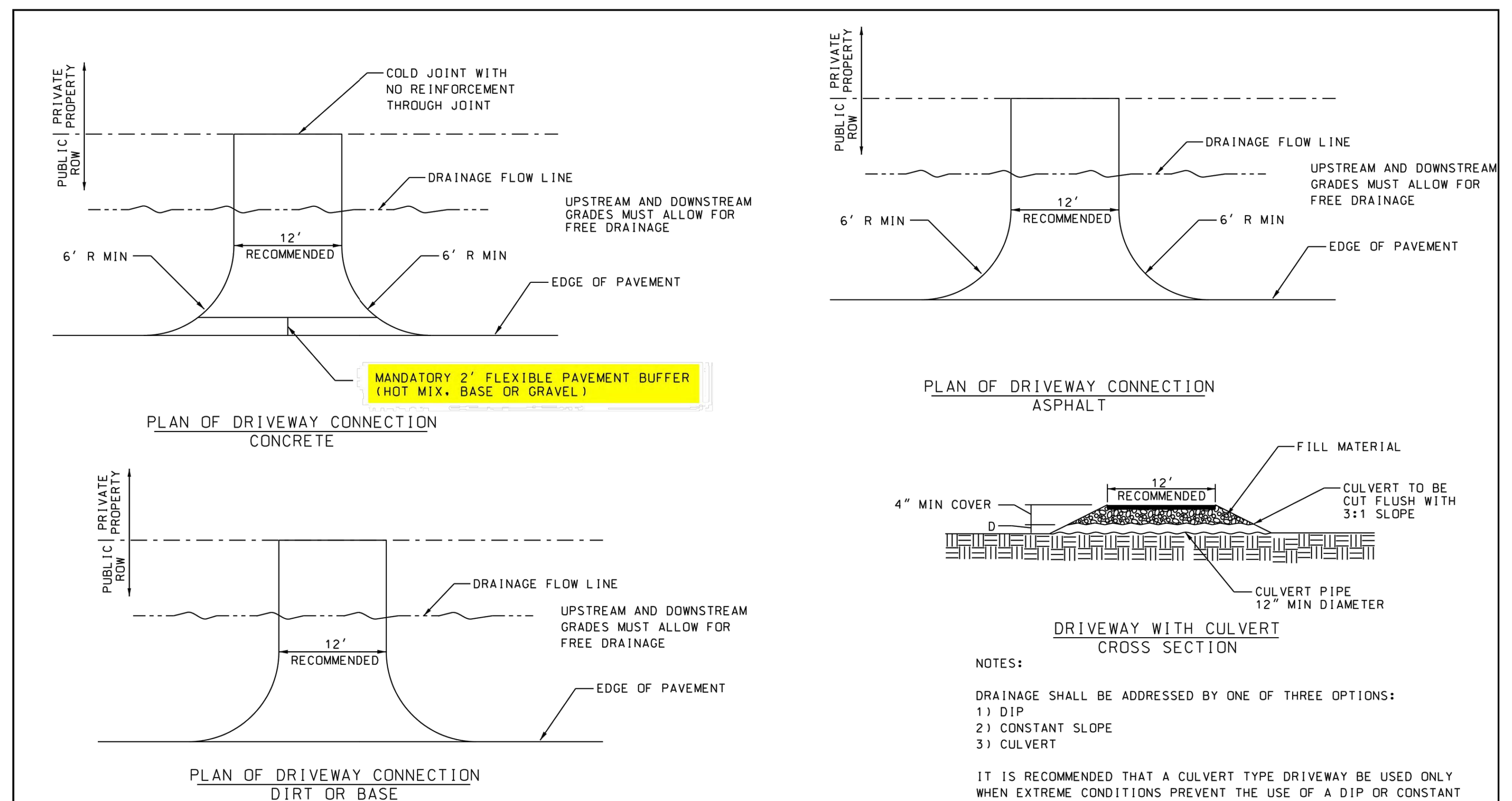
NOTES:
* MARKER TAPE ATTACHED TO THE TOP OF PIPE WITH DUCT TAPE
**INSULATED 12 AWG SOLID DIRECT BURIAL RATED (30 MIL POLYETHYLENE JACKET MINIMUM) COPPER TRACER WIRE SHALL BE INSTALLED ABOVE AND ALONG ALL WATER LINES (NOT INCLUDING COPPER SERVICES). WIRE SHALL BE SECURELY FASTENED TO THE PIPELINE AND SHALL BE PLACED ALONG THE OUTSIDE OF VALVE BOX RISERS WITH AT LEAST TWO FEET OF SLACK COILED INSIDE THE VALVE BOX. WIRE SHALL TERMINATE IN AN APPROPRIATE LOCATION SUCH AS A VALVE BOX, BLOW OFF BOX, AIR VALVE BOX, OR IN A DEDICATED CHRISTY G-5 VALVE BOX. CONTINUITY TESTING ON THE TRACER WIRE SHALL BE PERFORMED AFTER BACKFILL AND COMPACTION AND PRIOR TO FINAL PAVING. THE LOCATION OF THE TRACER WIRE AND LEADS SHALL BE MARKED ON RECORD DRAWINGS WITH THE LEAD LOCATION CLEARLY MARKED IN THE FIELD.

GENERAL NOTES:
(1) FOR ADDITIONAL INFORMATION, SEE CANYON LAKE WATER SERVICE COMPANY'S STANDARD SPECIFICATIONS.

BY	REVISION	DATE	CK	AP	OPS

CLWSC
CANYON LAKE WATER SERVICE COMPANY
1399 Sattler Road
Canyon Lake, Texas 78133
(830) 964-3854

MARKER TAPE AND TRACE WIRE DETAIL
BY: M.H. / OTHERS — OPERATIONS / DATE
DATE: 02-14-09 — ENGINEERING / DATE
CK:
SCALE: NONE — DIRECTOR OF ENGINEERING / DATE
REF. NOS.
DWG. NO. MAIN-TW
SHEET: 1 OF 1



NOTES:

DRAINAGE SHALL BE ADDRESSED BY ONE OF THREE OPTIONS:
1) DIP
2) CONSTANT SLOPE
3) CULVERT

IT IS RECOMMENDED THAT A CULVERT TYPE DRIVEWAY BE USED ONLY WHEN EXTREME CONDITIONS PREVENT THE USE OF A DIP OR CONSTANT SLOPE FROM BEING FEASIBLE. CONSULT WITH COMAL COUNTY ENGINEER'S OFFICE FOR APPLICATION TO LOCAL CONDITIONS.

NO OTHER IMPROVEMENTS THAT PROJECT ABOVE EXISTING GRADE SHALL BE ALLOWED WITHIN THE COUNTY RIGHT OF WAY.

WATER MUST FLOW FREELY THROUGH CULVERT PIPE OR OVER DIP TYPE DRIVEWAY.

IT IS RECOMMENDED THAT THE CONTRACTOR CONTACT THE COMAL COUNTY ENGINEER'S OFFICE FOR FOR A PRE-POUR INSPECTION PRIOR TO POURING CONCRETE OR PLACING HOT MIX ASPHALT.

POTENTIAL CONCRETE AND ASPHALT CONTRACTORS(*):	
SILVERADO CONSTRUCTION	(830) 639-4439
GIBSON CONSULTING	(830) 822-4869
BACKHOE BOB	(830) 935-3388
JACK RYAN	(830) 899-3200
C.B. PAVING	(830) 980-2880
JCN CONSTRUCTION	(830) 228-5025
PDQ CONCRETE	(210) 521-7783

POTENTIAL PIPE DISTRIBUTORS(*):	
TX CORRUGATORS	(210) 653-1600
McCOYS	(830) 629-2111
HOME DEPOT	(830) 625-3334
EBERHARDT	(830) 625-4616

(*) THESE CONTRACTORS VOLUNTAIRLY SUPPLIED THEIR NAMES TO COMAL COUNTY. THEY ARE LISTED IN NO PARTICULAR ORDER. THE COUNTY IS NOT RECOMMENDING THESE PARTICULAR CONTRACTORS. IT IS SIMPLY PROVIDING A LIST OF CONTRACTORS TO HELP WITH THE FACILITATION OF DRIVEWAY CONSTRUCTION.

Comal County
Road Department
195 David Jonas Drive
New Braunfels, TX 78132
Phone: (830) 608-2090
Fax: (830) 608-2009

DRIVEWAY DETAIL STANDARD

Date: 08/11/03
Drawn by: RHB
Checked by: THH

REVISIONS	
No.	Date:
1.	06/08/09

SCALE: NTS
Sheet 1 of 1

DVO PROJECT – 182017

BROWN REYNOLDS WATFORD ARCHITECTS
2700 EARL RUDDER FRWY SOUTH
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DATE 04/08/2019
DRAWN BY
CHECKED BY
BRW PROJECT NUMBER 218007.00

COMAL COUNTY ESD
FIRE AND EMS
STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

NO.	INI.	REVISION	DATE
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C10
MISCELLANEOUS DETAILS

"TxDOT CONSTRUCTION GENERAL NOTES"

1. "The design and construction will provide for preserving all existing features in or near the State Right Of Way being affected by the widening. This includes but is not limited to, existing driveway gate set-backs, relocation of electronic private property gates, mailbox turnouts, mail boxes and supports, cattle guards, roadway signing, existing rip-rap or other permanent erosion control features, diversionary berms, swales, ditches, amount and configuration of driveway flares and driveway centerline profile, metal beam guard fence and end treatments, etc. Existing driveway culverts and safety end treatments if effected by roadway widening will be reconstructed to preserve existing front slope rates. The coordination of items that effect existing private property access, mail delivery, etc. is the responsibility of the developer. The written concurrence of any effected property owners for construction effecting their driveways or mailbox turnouts must be obtained and provided TxDOT prior to TxDOT driveway permits being issued."

2. "For work in State Right Of Way, the developer is responsible for coordination of, obtaining permits for, and complying with any and all state and federal regulatory agencies and all applicable laws, rules and regulations pertaining to the regulation of drainage, preservation of cultural resources, natural resources and the environment. The developer is responsible for determining if the project is in an environmentally sensitive area such as within the recharge or contributing zone of protected aquifers, and act in accordance with all resource agency regulations."

   If TxDOT has a CZP or WPAP on file with TCEQ, the developer is responsible for amending TxDOT's permit, obtaining TCEQ approval and providing TxDOT with the approved amended permit. The amended permit will address the relocation of any TxDOT permanent BMP's including vegetative filter strips that may be impacted by work done within TxDOT ROW. "

   If TxDOT does not have a CZP or WPAP on file with TCEQ, any permanent BMP's including vegetative filter strips, that may be required in order to treat additional impervious cover placed in TxDOT ROW will be located in private property and the developer will provide TxDOT with evidence of TCEQ approval of the additional impervious cover."

   The developer may not operate under resource agency environmental clearance of a previous or ongoing TxDOT project, but will be required to obtain separate resource/environmental agency clearance."

3. "If waste areas or material source areas result from this project, the Contractor is reminded to follow the requirements of the Texas Aggregate Quarry and Pit Safety Act. In addition, it is requested that these areas not be visible from any highway on the State system."

3.5. "Any materials removed and not reused and determined to be salvageable shall be stored within the project limits at an approved location or delivered undamaged to the storage yard as directed. Properly dispose unsalvageable materials in accordance with local, state, and federal regulations. Deface traffic signs so that they will not reappear in public as signs."

4. "Any trees existing within State Right Of Way are the natural resources of the State and will be protected. In the event that trees must be removed, TxDOT written permission will be received in advance and will identify the specific trees by species, diameter and location to be removed. The developer will be fined for any unpermitted removal of trees."

4.5. "In the event that there are areas of public ROW dedication resulting from the platting process, the area within the public ROW dedication does not pass into TxDOT ownership as a result of platting. However, the developer will remove any old fencing, gates and unsightly vegetation within the area of the ROW dedication, leaving it in an aesthetically pleasing condition. The Area of ROW dedication will not be mowed or otherwise maintained by TxDOT. Prior to removal of trees in the area of ROW dedication, the trees will first be evaluated in accordance with the requirements of local tree protection ordinances and the written concurrence of the local jurisdiction will be provided to TxDOT."

5. "The developer will maintain at the project site, and make available upon request, copies of all approved environmental plans and permits relating to work in State Right Of Way."

6. "Prior to beginning grading activity the contractor will set and maintain roadway stationing, control points, marks, stakes to establish lines, slopes, grades and centerlines."

7. "Any slopes in State Right Of Way which become steeper than 3:1 as a result of the work will be treated with 4" thick reinforced concrete riprap and be treated with metal beam guard fence. This may entail additional rip-rap beyond that shown in the plans."

7.5. "Unless otherwise shown on the plans, where existing concrete rip-rap is removed, modified or extended, the portion to be removed will be neatly saw-cut prior to removal and the new rip-rap will be formed to match the existing lines and grades of the existing rip-rap and will be doweled into the existing rip-rap with #3 bars on 12" centers. The dowel bars will be epoxied in place with epoxy meeting TxDOT requirements. The minimum embedment length is 9 inches. This applies to any type of concrete rip-rap including metal beam guard fence or cable barrier mow strips. "

8. "Duane Hofferichter (830) 609-0707 New Braunfels, Travis Young (830) 303-0130 Seguin, Chad Lux (830) 816-2430 Boerne, Mark Andrews (830) 393-3144 Floresville, TxDOT Maintenance office will be contacted by the contractor 48 hours prior to work occurring in State Right Of Way."

9. "State Right Of Way will not be used as an area for contractor parking or for staging the receipt of materials or equipment."

10. "Traffic control and construction barricades will meet the requirements of the Texas MUTCD."

11. "The contractor will provide advance notification to the engineer of impending/upcoming lane closures for all temporary and/or permanent lane, ramp, connector, frontage, shoulder, median crossover, etc. closures or detours."

12. "Access to adjoining property must be maintained at all times."

13. "Unless otherwise noted in the plans and/or as directed by the area engineer or maintenance supervisor, daily lane closures shall be limited according to the following restrictions:

    Nighttime: Maintenance Supervisor and/or Area engineer approval required. (with uniformed off duty law enforcement officers).

    Weekend Closures: Maintenance Supervisor and/or Area engineer approval required."

14. "No lane closures or roadway closures will be permitted for the following key dates and/or special events:

    Between December 15 and January 1.
    Wednesday before Thanksgiving thru the Sunday after Thanksgiving.
    Saturday and Sunday before Memorial Day and Labor Day.
    Saturday or Sunday when July 4 falls on a Friday or Monday."

15. "At no time will the roadway travel way be blocked"

16. "Lane closures will only be permitted with 48 hour prior approval of the TxDOT Maintenance Supervisor. Lane closures will be permitted only between 9:00 a.m. and 4:00 p.m. Monday through Friday."

16.5. "For lane closures on two-lane two-way roadways, including during pilot car operations, flaggers will be placed at the beginning and end of the work zone as well as at each individual driveway and side road intersection within the limits of the work zone and extending for a minimum of the beginning of advanced warning signs either end of the work zone to control, warn and direct side road and driveway traffic of the change in traffic operations. Whenever one way traffic control is accomplished by traffic signals work zone flaggers will be similarly stationed at each individual driveway and side road intersection within the limits of the work zone and extending for a minimum of the beginning of the advanced warning signs either end of the work zone. All flaggers will be in constant radio contact."

17. "A minimum 3:1 (H:V) temporary safety slope of stable compacted material will be required adjacent to the State highway edge of pavement at all times during non working hours."

18. "Only one side of the roadway will be open to construction at a time. Work will be completed and pavement edges backfilled on one side of the road before work will begin on the opposite side of the roadway.

19. "All milling, paving and seal coat operations shall proceed in the direction of traffic."

20. "Any pavement edge drop-offs between 1 and 2 inches in height will have CW 8-11 warning signs. Any pavement edge drop-off 2 inches or greater will have a 3:1 compacted safety slope and CW 8-9a or CW 8-11 signs plus channelizing devices. Pavement edges will be shouldered up with compacted embankment material and 4 inches of topsoil as soon as possible after paving is completed on the side of the road being widened."

21. "Proof rolling of subgrade is required and shall be witnessed by TxDOT prior to placement of pavement structure unless otherwise approved by the TxDOT Maintenance Supervisor. The requirement for proof-rolling of subgrade is not superseded by any other requirements including those of any Geotechnical Report. "

22. "All Flexible Base will have a minimum Plasticity Index of 4."

23. "All courses of asphaltic concrete pavement (regardless of type) will be placed with a asphalt paving equipment meeting the requirements of TxDOT Item 320, "Equipment for Asphalt Concrete Pavement", unless otherwise approved by the Maintenance Supervisor."

24. "All surface aggregates will meet the requirements of TxDOT friction classification "B" and will meet PG Binder grade 70-22."

25. "All surface Asphalt Concrete Pavement will be under-sealed with a One Course Surface Treatment."

26. "All Asphaltic Concrete Pavement used in base courses will be Type "A" or "B" and will meet PG binder grade 64-22."

27. "All pavement widening including shoulders will match the existing pavement cross slope."

28. "All pavement markings will be Type I thermoplastic (100 mil) with under-seal meeting the requirements of TxDOT Item 666, Reflectorized Pavement Markings. The contractor will place guide marks in accordance with Item 666 and will make arrangements for TxDOT inspection of the pavement marking layout prior to placement of striping. Equipment used for the placement of striping will meet the production requirements of Item 666 unless otherwise approved in advance by the TxDOT Maintenance Supervisor."

29. "Existing pavement markings that conflict with proposed pavement markings will be lightly ground in a manner that does not damage the pavement surface, to remove any pavement marking accumulation, and will be covered with a strip seal of 18" minimum width, consisting of precoated grade 5, friction class B aggregate."

30. "All materials and construction methods used in State Right Of Way will meet TxDOT specifications. This supersedes all other specifications in the plans."

31. "All turn lane concrete pavement in state ROW will meet the requirements of TxDOT Item 360 Class P concrete and will be batched at concrete plants having a current approved mix design. Class P concrete shall have 7 and 28 day compressive strength of 3200 psi and 4400 psi respectively."

32. "When widening existing concrete pavements, joints in the new pavement will match joints in existing pavement and curb."

33. "The contractor is responsible for ensuring that TxDOT approved materials, mix designs, approved sources and products are used for all work in state ROW. The contractor will arrange for the services of a qualified testing laboratory for all items requiring testing and will notify TxDOT of any discrepancies between test results and TxDOT specs in a timely manner. The contractor will provide to TxDOT invoices and testing results as soon they are available. Failure to do this will result in rejection of the work."

34. "Sawing of contraction/construction joints in concrete pavement will be accomplished as soon as personnel can walk on the concrete without damaging the surface regardless of time of day or weather conditions. Stand-by power driven concrete saws will be provided during the sawing operation. Curing compound will be re-applied to the sawed joint immediately upon sawing the joint."

35. "Guardrail SGT's will be type 3 unless otherwise approved by the TxDOT Maintenance Supervisor. Guardrail mow strip placed adjacent to other concrete rip-rap will be separated by a formed construction joint."

36. "Any concrete curb to be removed will be saw-cut at the limits of removal and be removed entirely. Slicing the top portion of the curb off and leaving remaining portion of curb in place is unacceptable. "

37. "Any damage to TxDOT facilities will be repaired at no expense to the State, to TxDOT's satisfaction."

38. "Sidewalks placed in the highway right-of-way will be a minimum width of five feet or comply with the more stringent width as required by city ordinance and will meet all other requirements of the Americans with Disabilities Act. Pedestrian ramps will be provided at street and driveway intersections as shown on the current State Standard for Pedestrian Facilities. Color contrast and texturing of pedestrian ramps will be place at street intersection ramps only as shown on the current State Standard for Pedestrian Facilities. Pedestrian ramps at driveway intersections will not receive any color contrast or texturing. Metal plating for sidewalk bridges will match the typical width of the approach sidewalk. His may result in a width that is greater than shown in the standard details included in the plans."

39. "The contractor will use Best Management Practices (BMP's) to minimize erosion and sedimentation in the State Right Of Way resulting from the proposed construction. Re-vegetation of disturbed areas will be completed in accordance with TxDOT Standard Specifications. Permanent vegetative cover must achieve 70% coverage prior to project acceptance. Soil Retention Blankets may be required to prevent erosion of topsoil prior to vegetation re-establishment"

40. "Prior to seeding or re-vegetation the front slopes will be shouldered up with topsoil to eliminate any pavement edge drop-off."

41. "Mud tracked onto the roadway from the site will be immediately removed to the satisfaction of TxDOT."

42. "It will be the developer/owner's responsibility to clean out, to the state's satisfaction, any drainage structure or storm sewer system that becomes silted as a result of their operations."

43. "The adjustment of any utilities in State Right Of Way or adjacent private easement will be the responsibility of the developer/owner's."

44. "The contractor is responsible for placing and maintaining existing signs on TxDOT approved temporary mounts until permanent signs are placed."

45. "The final placement of permanent signs will be coordinated prior to placement with the local TxDOT Maintenance Supervisor."

46. "For work within the State Right Of Way where removal of materials or debris within the construction limits and not incorporated in the finished roadway section of right of way, will be disposed of in a manner acceptable to the Maintenance Supervisor at no expense to the State. Materials that are not determined to be salvageable by the Maintenance Supervisor become the property of the Contractor for proper disposal at their expense. Materials determined to be salvageable will be returned to the State and delivered to the location as determined by the Maintenance Supervisor."

47. "Regardless of errors and omissions in information provided in the plans or cross-sections the permitee is responsible for providing for positive drainage outfalls within and off the limits of the project."

48. (**For Work in City of New Braunfels**) "All traffic signals on the state highway system within the New Braunfels city limits, with the exception of signals on IH 35, are the responsibility of the City of New Braunfels and the City of New Braunfels will perform construction inspection. Contact Garry Ford, P.E. at (830) 221-4645, 48 hours prior to the need for any inspections. Also when non-traffic signal work is being performed within 400 feet of an existing signalized intersection, flashing beacon or school zone flasher or other type of signal; if within the City of New Braunfels area of responsibility contact Garry Ford, P.E. to determine/verify the location of loop detectors, conduit, ground-boxes, etc. For all other locations, contact TxDOT representative, Mike Garza, at (210) 615-6028, e-mail is Mike.Garza@txdot.gov. The contractor is responsible for repair or replacement of any signal equipment damaged by construction operations. The method of repair or replacement shall be pre-approved and inspected. Depending on the type and extent of the damage, the Engineer reserves the right to perform the repair or replacement work and the Contractor will be billed for this work. When working near aerial electrical lines or utility poles, comply with Federal, State and local regulations."

49. (**For areas other than City of New Braunfels**) "When non-traffic signal work is being performed within 400 feet of an existing signalized intersection, flashing beacon or school zone flasher or other type of signal, contact TxDOT representative, Mike Garza, at (210) 615-6028, e-mail is Mike.Garza@txdot.gov. The contractor is responsible for repair or replacement of any signal equipment damaged by construction operations. The method of repair or replacement shall be pre-approved and inspected. Depending on the type and extent of the damage, TxDOT reserves the right to perform the repair or replacement work and the Contractor will be billed for this work. When working near aerial electrical lines or utility poles, comply with Federal, State and local regulations."

DVO PROJECT – 182017

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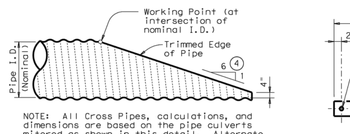
NO.	INI.	REVISION	DATE
1	JWD	POST BID ADDENDUM	06/06/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C11

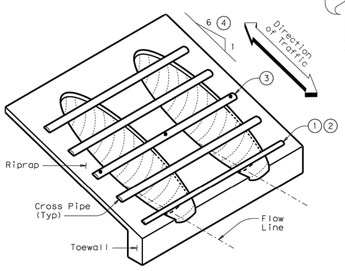
TXDOT CONSTRUCTION GENERAL NOTES



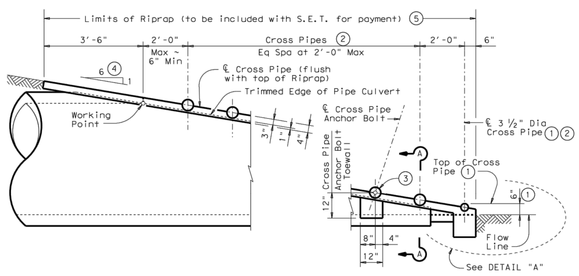
NOTE: All Cross Pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing Corrugated Metal Pipe Culvert.)
(Details at Concrete Pipe Culvert are similar.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

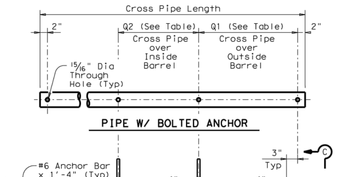
(Showing Concrete Pipe Culvert.)
(Details at Corrugated Metal Pipe Culvert are similar.)

NOTE: All Cross Pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

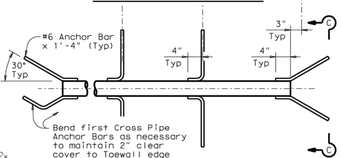
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing Corrugated Metal Pipe Culvert.)
(Details at Concrete Pipe Culvert are similar.)

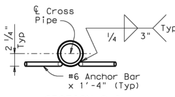
ISOMETRIC VIEW OF TYPICAL INSTALLATION



PIPE W/ BOLTED ANCHOR

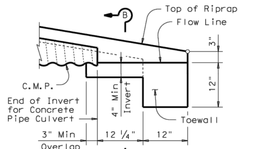


PIPE W/ ANCHOR BARS



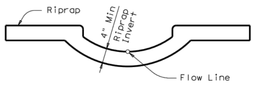
SECTION C-C

CROSS PIPE DETAILS



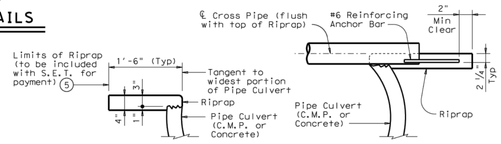
DETAIL "A"

(Showing Invert with Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Cross Pipes not shown for clarity.)



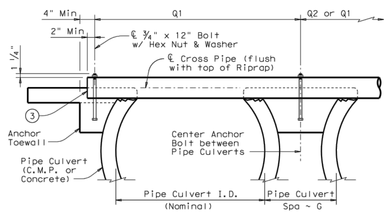
SECTION B-B

(Cross Pipes not shown for clarity.)



SHOWING TYPICAL PIPE CULVERT & RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, & RIPRAP QUANTITIES 2

Nominal Culvert I.D.	Conc Riprap (CY) 6	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for use of Cross Pipes	Cross Pipe Size
12"	0.6	9"	N/A	2'- 1"	1'- 9"	3 or more Pipe Culverts	3" Std (3.500" O.D.)
15"	0.7	11"	N/A	2'- 5"	2'- 2"		
18"	0.8	1'- 2"	N/A	2'-10"	2'- 8"		
21"	0.9	1'- 4"	N/A	3'- 2"	3'- 1"		
24"	0.9	1'- 7"	N/A	3'- 6"	3'- 7"		
27"	1.0	1'- 8"	N/A	3'-10"	3'-11"	3 or more Pipe Culverts	3 ½" Std (4.000" O.D.)
30"	1.1	1'-10"	N/A	4'- 2"	4'- 4"	2 or more Pipe Culverts	
33"	1.2	1'-11"	4'- 2"	4'- 5"	4'- 8"	All Pipe Culverts	
36"	1.3	2'- 1"	4'- 5"	4'- 9"	5'- 1"	All Pipe Culverts	4" Std (4.500" O.D.)
42"	1.5	2'- 4"	4'-11"	5'- 5"	5'-10"		
48"	1.7	2'- 7"	5'- 5"	6'- 0"	6'- 7"	All Pipe Culverts	5" Std (5.563" O.D.)
54"	2.0	3'- 0"	5'-11"	6'- 9"	7'- 6"		
60"	2.2	3'- 3"	6'- 5"	7'- 4"	8'- 3"		
66"	2.4	3'- 3"	6'-11"	7'-10"	8'- 9"		
72"	2.7	3'- 4"	7'- 5"	8'- 5"	9'- 4"		

1. The proper installation of the first Cross Pipe is critical for vehicle safety. The top of the first Cross Pipe must be placed at no more than 6" above the flow line.
2. Size of Cross Pipes, except the first bottom pipe, shall be as shown in the PIPE SIZE table. The first bottom pipe shall be 3 ½" Standard Pipe (4" O.D.).
3. The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, all other Cross Pipes may also be installed using the bolted connection details.
4. Match Cross Slope as shown elsewhere in the plans. Cross Slope of 6:1 or flatter is required for vehicle safety.
5. Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".
6. Quantities shown are for one end of one reinforced Concrete Pipe Culvert. For multiple pipe culverts or for Corrugated Metal Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

GENERAL NOTES:

Cross Pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Cross Pipes.

Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap".

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

Cross Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

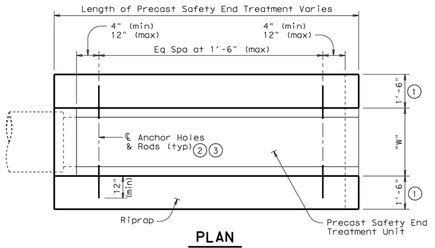
Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT

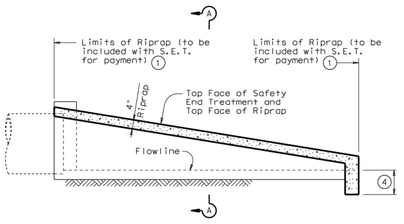
FOR 12" DIA TO 72" DIA
PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD

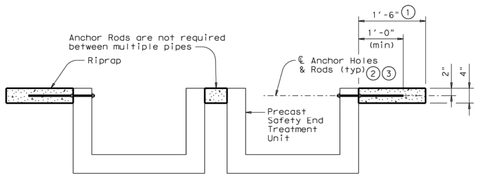
FILE:	setppse.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT	February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS					
11-10 Add note for synthetic fibers.		DIST	COUNTY		SHEET NO.



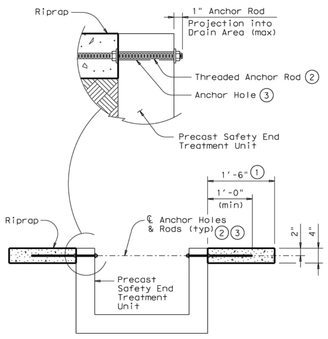
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

Nominal Culvert (Pipe) I.D.	PSET-SC & PSET-SP Standards				PSET-RC & PSET-RP Standards			
	Unit Width "W"	Side Slope 3:1	Side Slope 4:1	Side Slope 6:1	Unit Width "W"	Side Slope 3:1	Side Slope 4:1	Side Slope 6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

1. Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap". When Riprap is cast integrally with the Precast Safety End Treatment, this dimension shall be 1'-0" minimum.
2. ½" Diam A307 Gr. A threaded Anchor Rod w/ 2 nuts & 2 washers. All components shall be galvanized in accordance with Item 445, "Galvanizing". Galvanizing that is damaged during transport or construction shall be repaired in accordance with the specifications.
3. ¾" through holes in walls of Safety End Treatment for Riprap Anchor Rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Percussive (star) type drilling equipment shall not be used. If holes are drilled, spalls in the inside face of the wall exceeding ½" from the holes shall be patched.
4. Provide Riprap Toe Wall when dimension is shown elsewhere in the plans or when field conditions require a Toe Wall.
5. Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast S.E.T. standards.

GENERAL NOTES:

Precast Safety End Treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

Riprap shall be Class "B" Riprap in accordance with Item 432, "Riprap". Payment for Riprap and Toewalls is included in the Price Bid for each Safety End Treatment.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. The anchor rods shown are always required.

Refer to PSET-SC or PSET-SP standard sheets for details of square Safety End Treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round Safety End Treatments not shown.

For precast units with integrally cast Riprap, reinforcing steel in the amount on 0.26 sq in/ft minimum shall be substituted for the threaded anchor rods shown. When requested, sealed engineering drawings shall be submitted for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral Riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.

These Riprap details are only applicable when notes that require placement of Riprap with Precast Safety End Treatments are shown elsewhere in the plans.

Precast units with integrally cast Riprap shall be permitted unless noted otherwise on the plans.

Texas Department of Transportation — Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II
RIPRAP DETAILS

PSET-RR

FILE:	psetrse.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
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REVISIONS					
11-10 Add note for synthetic fibers.		DIST	COUNTY		SHEET NO.

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TXDOT STANDARD DETAILS

C12

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COMAL COUNTY ESD
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STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

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STATE OF TEXAS
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6-6-19

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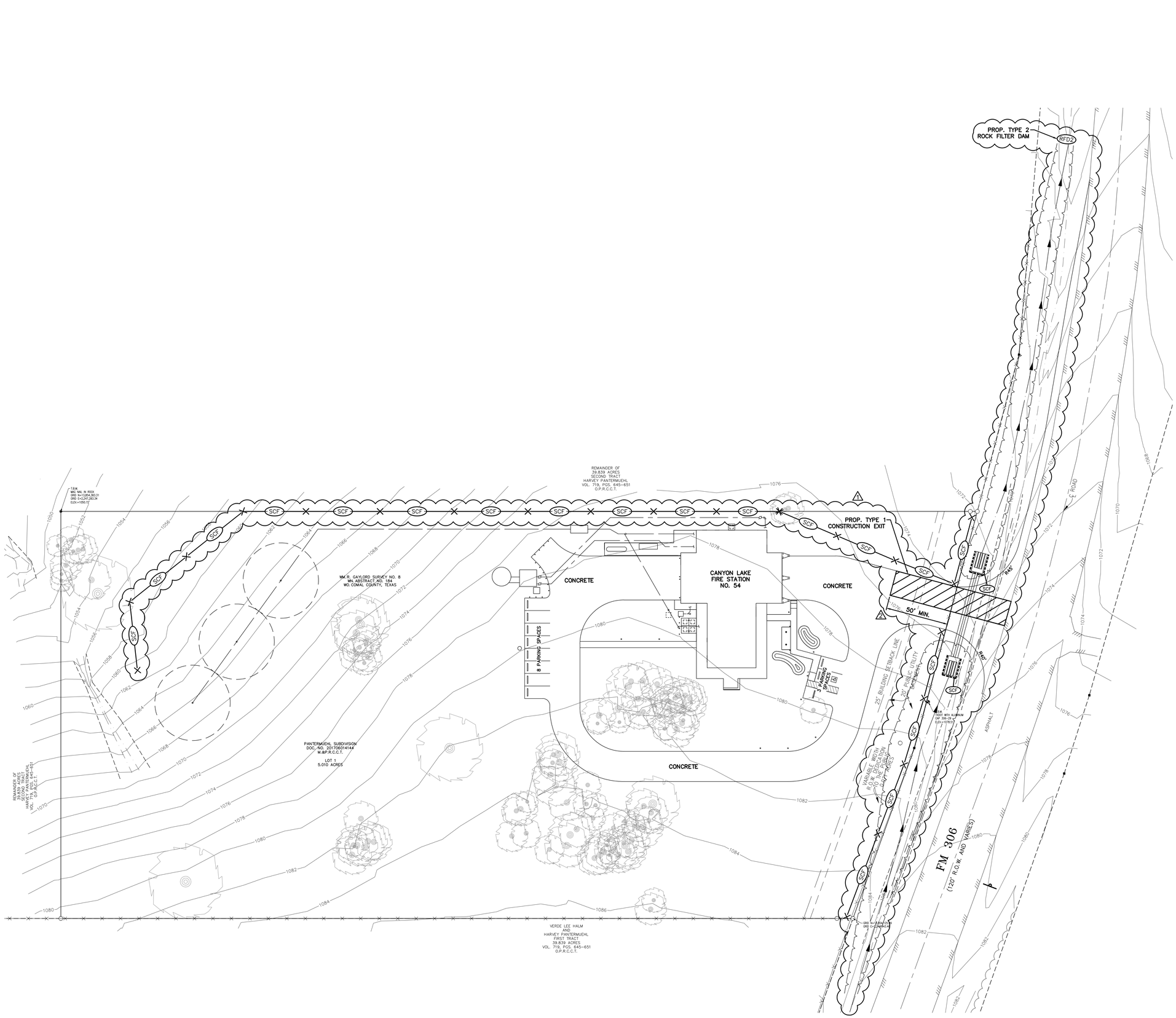

GENERAL CONSTRUCTION NOTES:

1. EXISTING CONDITIONS AND UNDERGROUND UTILITIES SHOWN ON PLANS ARE NOT GUARANTEED TO BE COMPLETE OR DEFINITE, BUT WERE OBTAINED FROM THE BEST INFORMATION AVAILABLE. CONTRACTOR TO FIELD VERIFY CONDITIONS PRIOR TO STARTING CONSTRUCTION.
2. CONTRACTOR TO VERIFY ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION.
3. THE LOCATION OF ALL UTILITIES PRESENTED ON THESE DRAWINGS IS SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
4. TxDOT RIGHT OF WAY WILL INCLUDE TOP SOIL, SODDING, SEEDING, FERTILIZER AND VEGETATIVE WATERING ALL DISTURBED AREAS TO COMPLY WITH TxDOT SPECIFICATIONS (2014) ITEMS 160, 162, 164, 166 AND 168. POLLUTION PREVENTION MEASURES IN TxDOT RIGHT OF WAY WILL REMAIN IN PLACE UNTIL A 70% VEGETATIVE COVER HAS BEEN ESTABLISHED ON ALL ONSITE AND OFFSITE DISTURBED SOILS, AS DIRECTED BY THE NEW BRAUNFELS MAINTENANCE SUPERVISOR. AFTER THE MAINTENANCE SUPERVISOR HAS AFFIRMED THE VEGETATION REQUIREMENTS HAVE BEEN MET THE CONTRACTOR WILL REMOVE ALL EROSION CONTROL MEASURES IN THE TxDOT RIGHT OF WAY.
5. CONTRACTOR TO OBTAIN ALL PERMITS AND APPROVALS REQUIRED PRIOR TO STARTING CONSTRUCTION.

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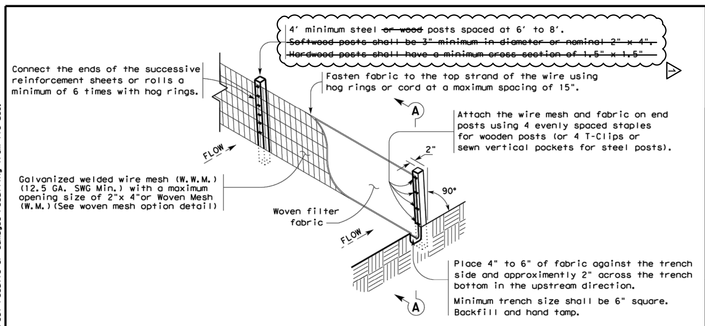
2	JWD	PERMIT REVISIONS	07/12/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

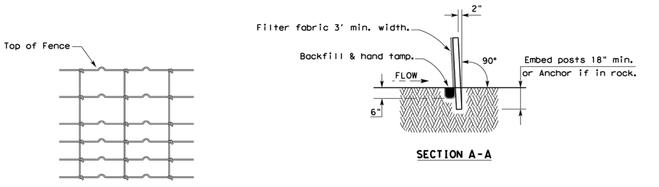
C13

POLLUTION PREVENTION PLAN



TEMPORARY SEDIMENT CONTROL FENCE

SCF



SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

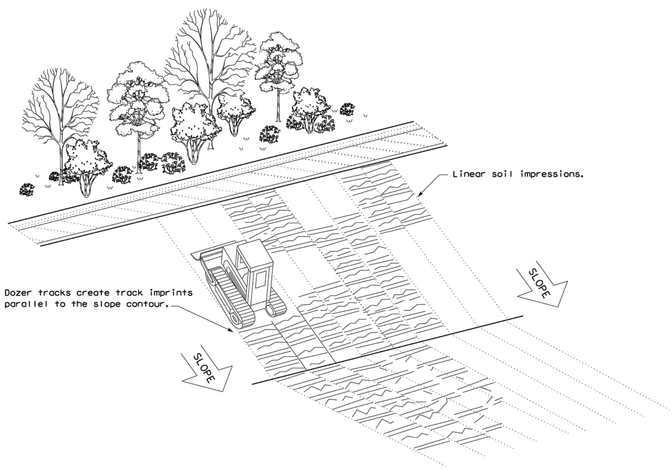
Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

LEGEND

Sediment Control Fence — SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DW/CK: LS
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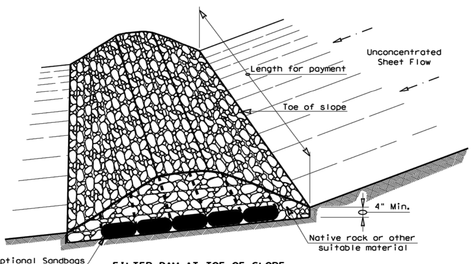
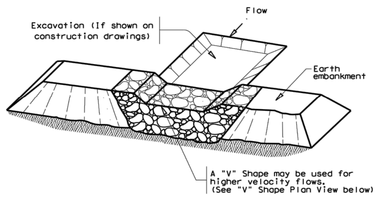


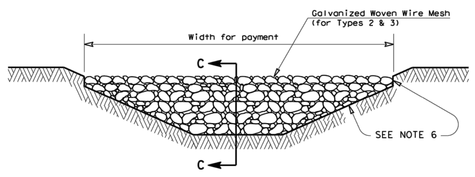
FILTER DAM AT TOE OF SLOPE

RFD1



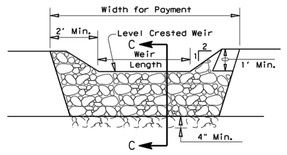
FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2

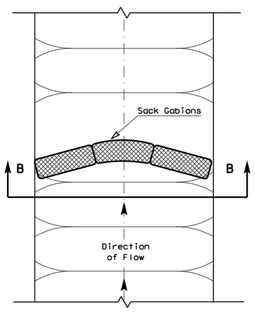


FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

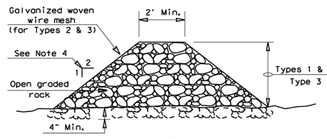


PROFILE

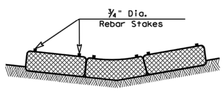


"V" SHAPE PLAN VIEW

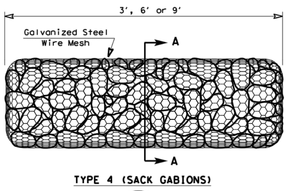
PLAN VIEW



SECTION C-C

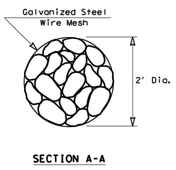


SECTION B-B



TYPE 4 (SACK GABIONS)

RFD4



SECTION A-A

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DW/CK: LS
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POLLUTION PREVENTION PLAN DETAILS
SHEET 1 OF 2

C14

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CANYON LAKE FIRE / EMS

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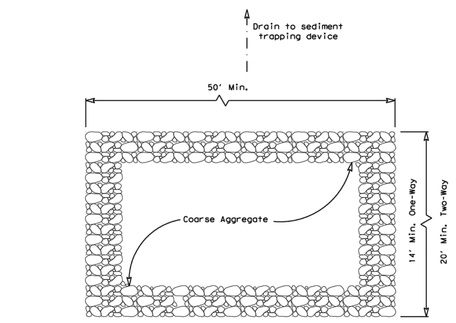
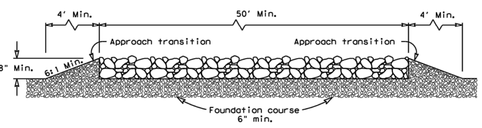


PLAN VIEW



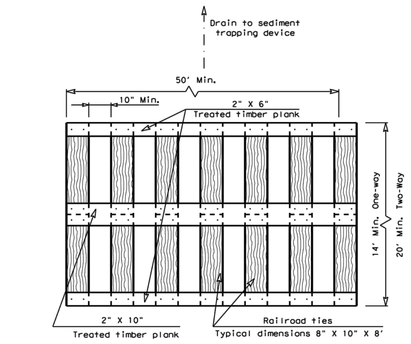
ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materials approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



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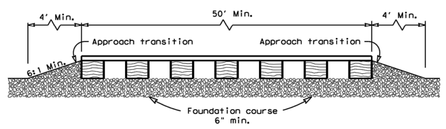


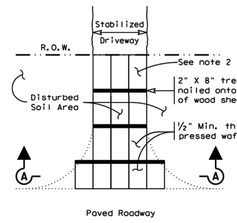
ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

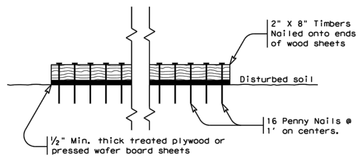
TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

SHORT TERM

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DW/CK: LS
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POLLUTION PREVENTION PLAN DETAILS
SHEET 2 OF 2

C15

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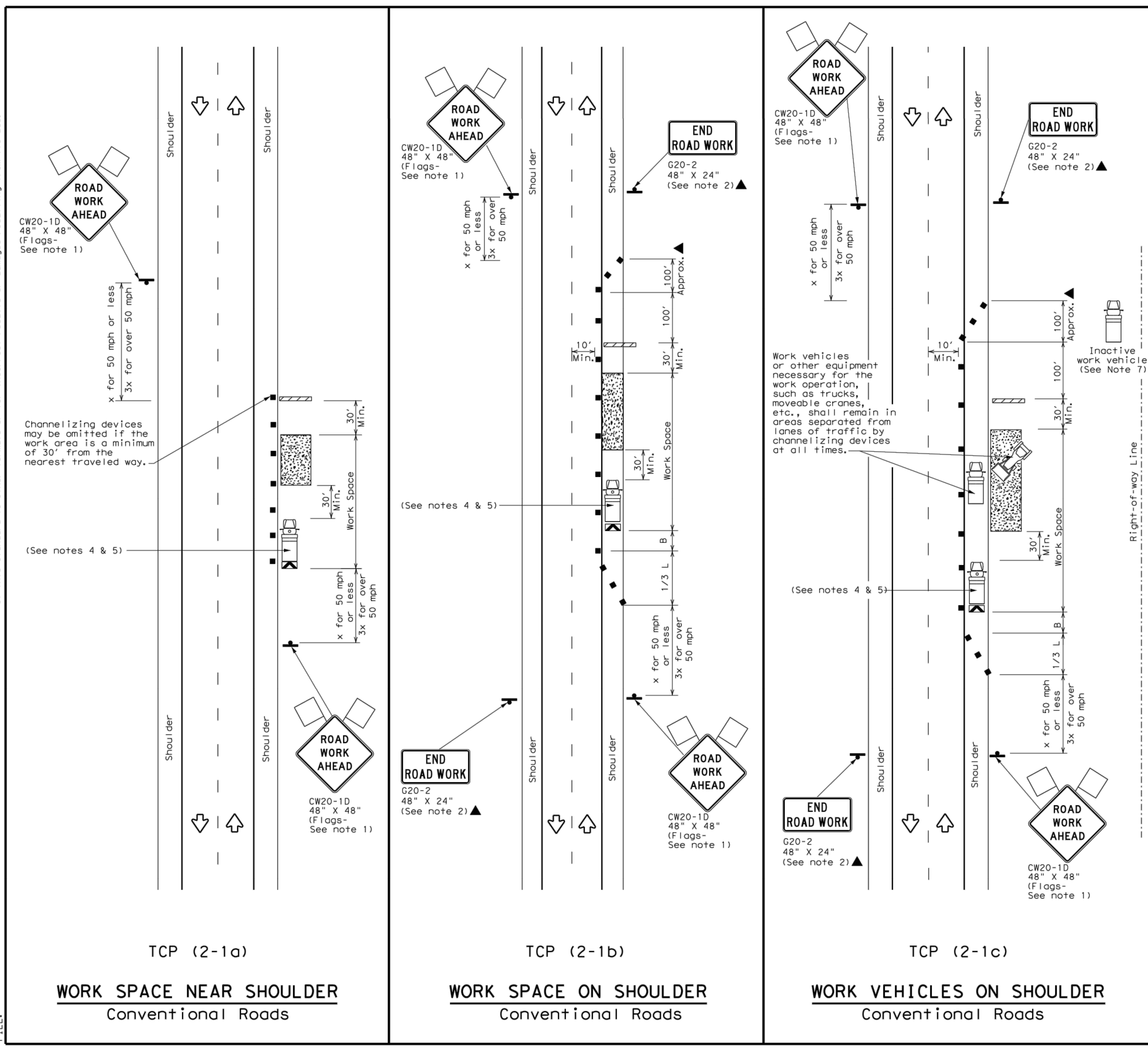

TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads

TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads

TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	✓

GENERAL NOTES

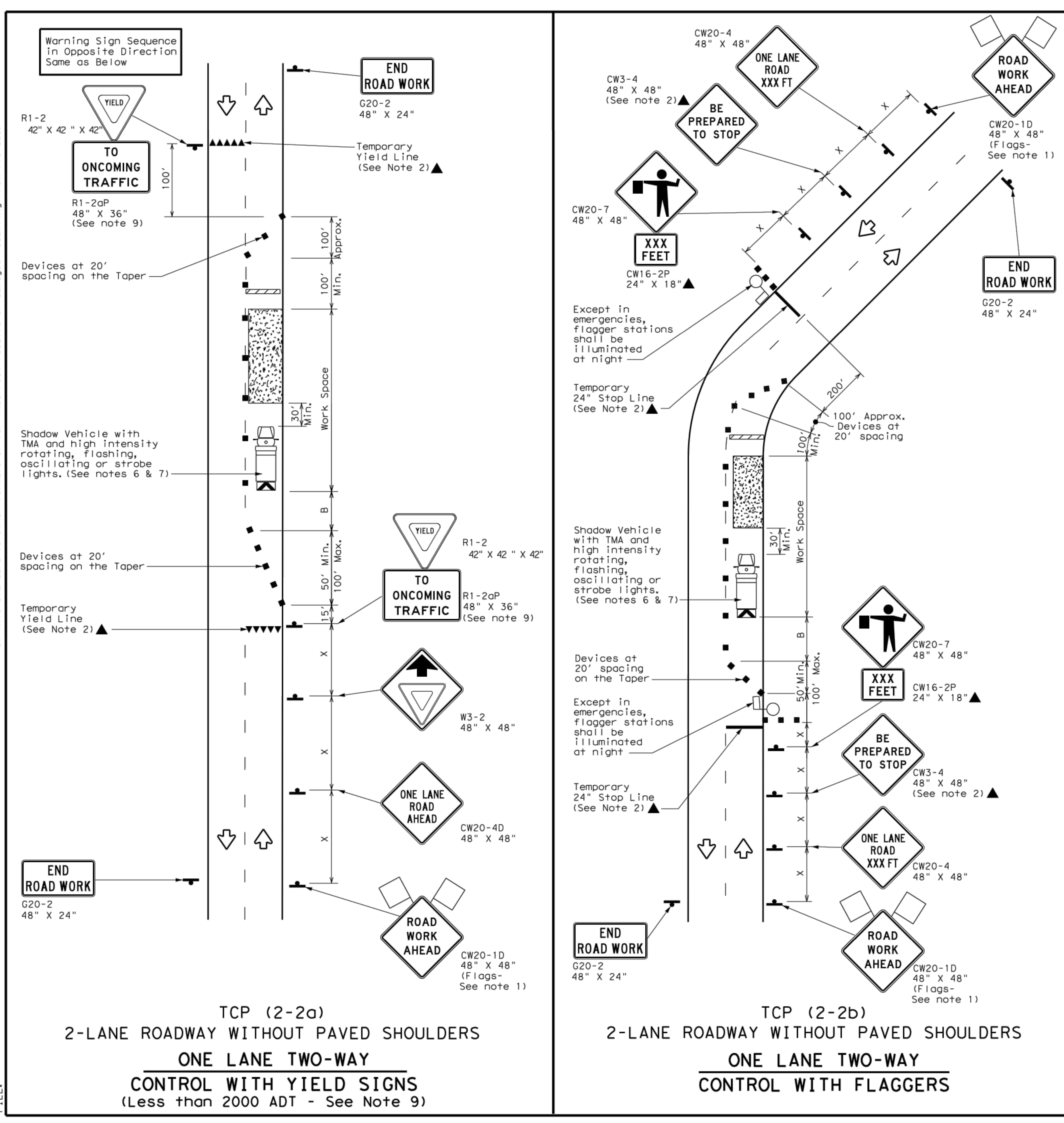
1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW21-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	DIST		COUNTY	SHEET NO.
161				



TCP (2-2a)

2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)

TCP (2-2b)

2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

8. The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
9. The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
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REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	DIST		COUNTY	SHEET NO.
162				

TxDOT TRAFFIC CONTROL NOTES:

1. ADVANCED WARNING SIGNS WILL REMAIN IN PLACE DURING THE DURATION OF THE DEVELOPMENT CONSTRUCTION FOR ADDITIONAL CONSTRUCTION VEHICLE TRAFFIC ENTERING AND EXITING THE DEVELOPMENT SITE.
2. ALL LANE CLOSURES WILL NOTIFY THE NEW BRAUNFELS MAINTENANCE OFFICE 48 HOURS IN ADVANCE OF THE LANE CLOSURE.
3. ALL TRAFFIC LANES WILL BE OPEN TO TRAFFIC AT THE END OF EACH WORK DAY.

NO.	INI.	REVISION	DATE
1	JWD	POST BID ADDENDUM	06/06/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

COMAL COUNTY ESD
FIRE AND EMS
STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

DATE 04/08/2019
DRAWN BY
CHECKED BY
BRW PROJECT NUMBER 218007.00

DVO
825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293-7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

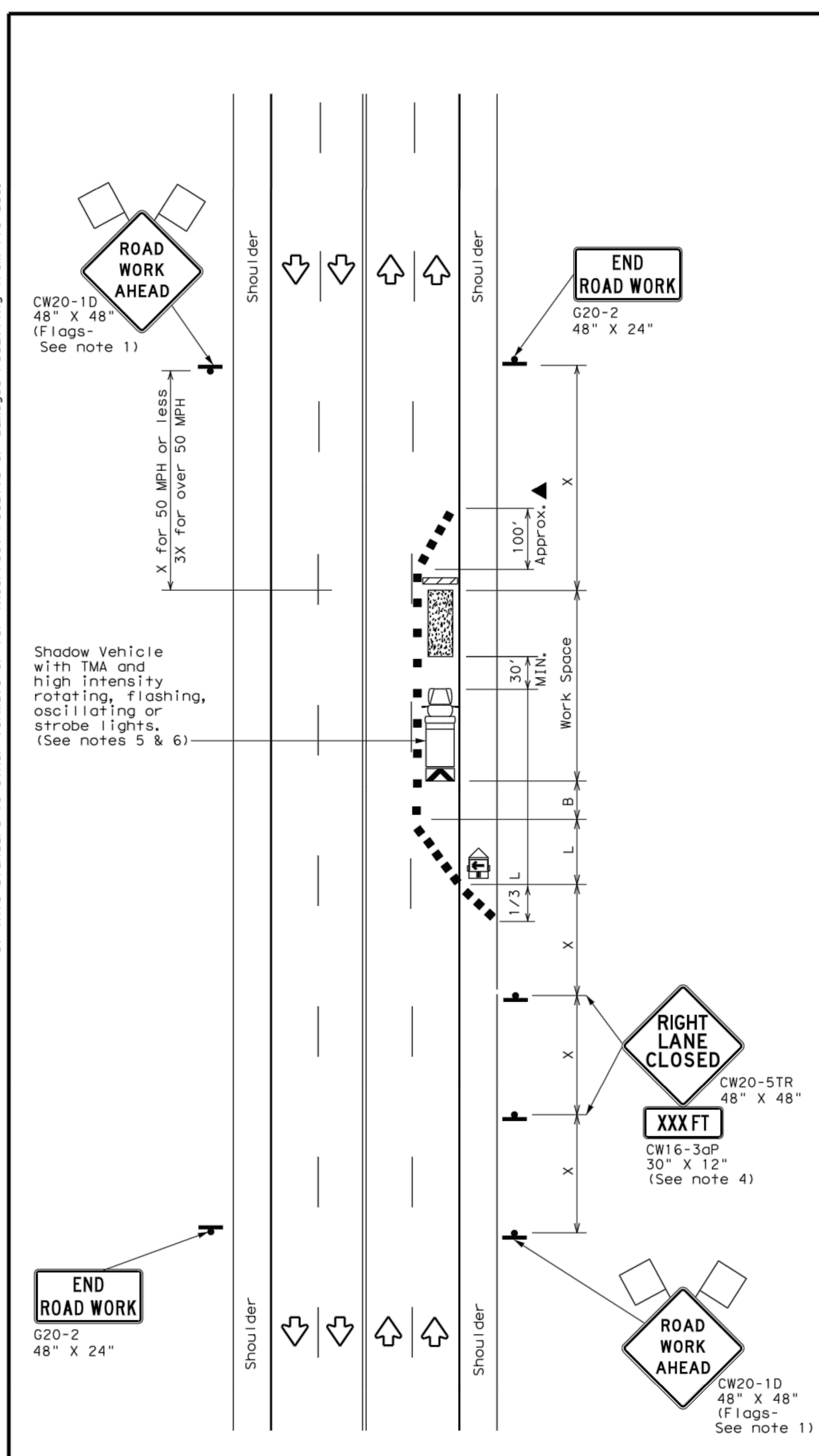
STATE OF TEXAS
JASON W. DAWSON
108125
LICENSED PROFESSIONAL ENGINEER
6-6-19

BROWN REYNOLDS WATFORD ARCHITECTS
2700 EARL RUDDER FRWY SOUTH
SUITE 4000
COLLEGE STATION, TEXAS 77845
979-694-1791
WWW.BRWARCH.COM

C16

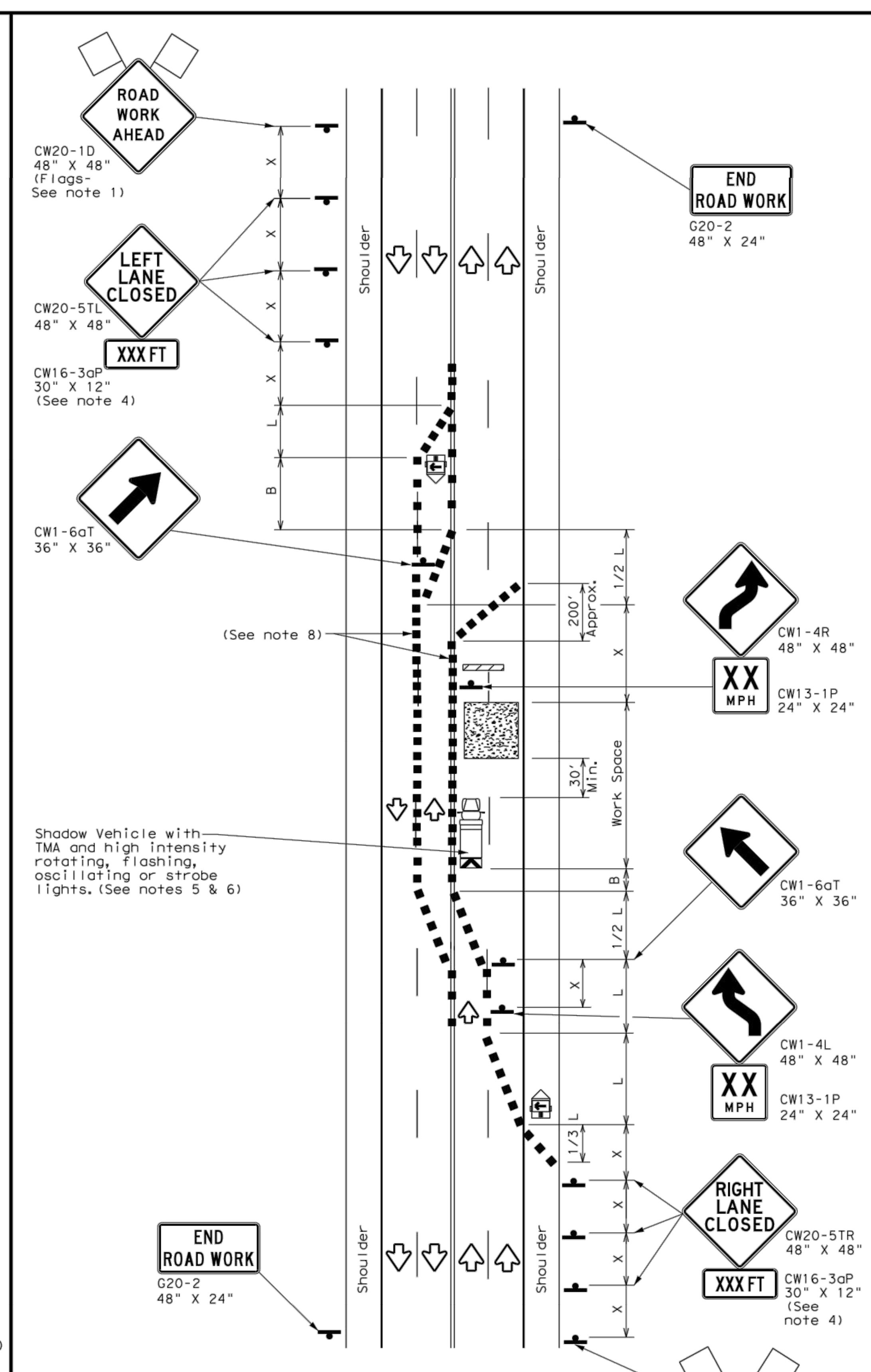
TRAFFIC CONTROL PLAN
DETAILS SHEET 1 OF 2

DVO PROJECT – 182017



TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

LEGEND

(symbol)	Type 3 Barricade	(symbol)	Channelizing Devices
(symbol)	Heavy Work Vehicle	(symbol)	Truck Mounted Attenuator (TMA)
(symbol)	Trailer Mounted Flashing Arrow Board	(symbol)	Portable Changeable Message Sign (PCMS)
(symbol)	Sign	(symbol)	Traffic Flow
(symbol)	Flag	(symbol)	Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
		✓	✓	

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
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REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	DIST		COUNTY	SHEET NO.

164

TxDOT TRAFFIC CONTROL NOTES:

1. ADVANCED WARNING SIGNS WILL REMAIN IN PLACE DURING THE DURATION OF THE DEVELOPMENT CONSTRUCTION FOR ADDITIONAL CONSTRUCTION VEHICLE TRAFFIC ENTERING AND EXITING THE DEVELOPMENT SITE.
2. ALL LANE CLOSURES WILL NOTIFY THE NEW BRAUNFELS MAINTENANCE OFFICE 48 HOURS IN ADVANCE OF THE LANE CLOSURE.
3. ALL TRAFFIC LANES WILL BE OPEN TO TRAFFIC AT THE END OF EACH WORK DAY.

C17

TRAFFIC CONTROL PLAN DETAILS SHEET 2 OF 2

NO.	INI.	REVISION	DATE
1	JWD	POST BID ADDENDUM	06/06/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

CANYON LAKE FIRE / EMS EST 1964

COMAL COUNTY ESD FIRE AND EMS STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

DATE 04/08/2019
DRAWN BY
CHECKED BY
BRW PROJECT NUMBER 218007.00

DVO
825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293-7500
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REGISTRATION NO. F-8334

STATE OF TEXAS JASON W. DAWSON 108125 LICENSED PROFESSIONAL ENGINEER 6-6-19

BRW
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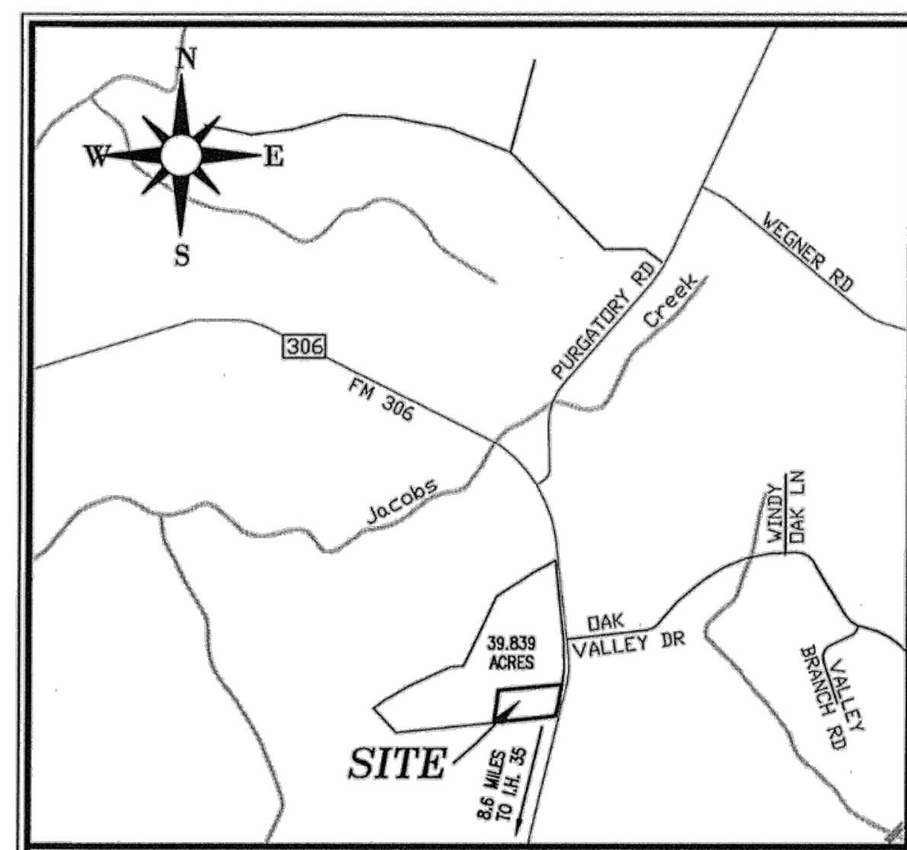
2700 EARL RUDDER FRWY SOUTH
SUITE 4000
COLLEGE STATION, TEXAS 77845
979-694-1791
WWW.BRWARCH.COM

DVO PROJECT – 182017



LOCATION MAP

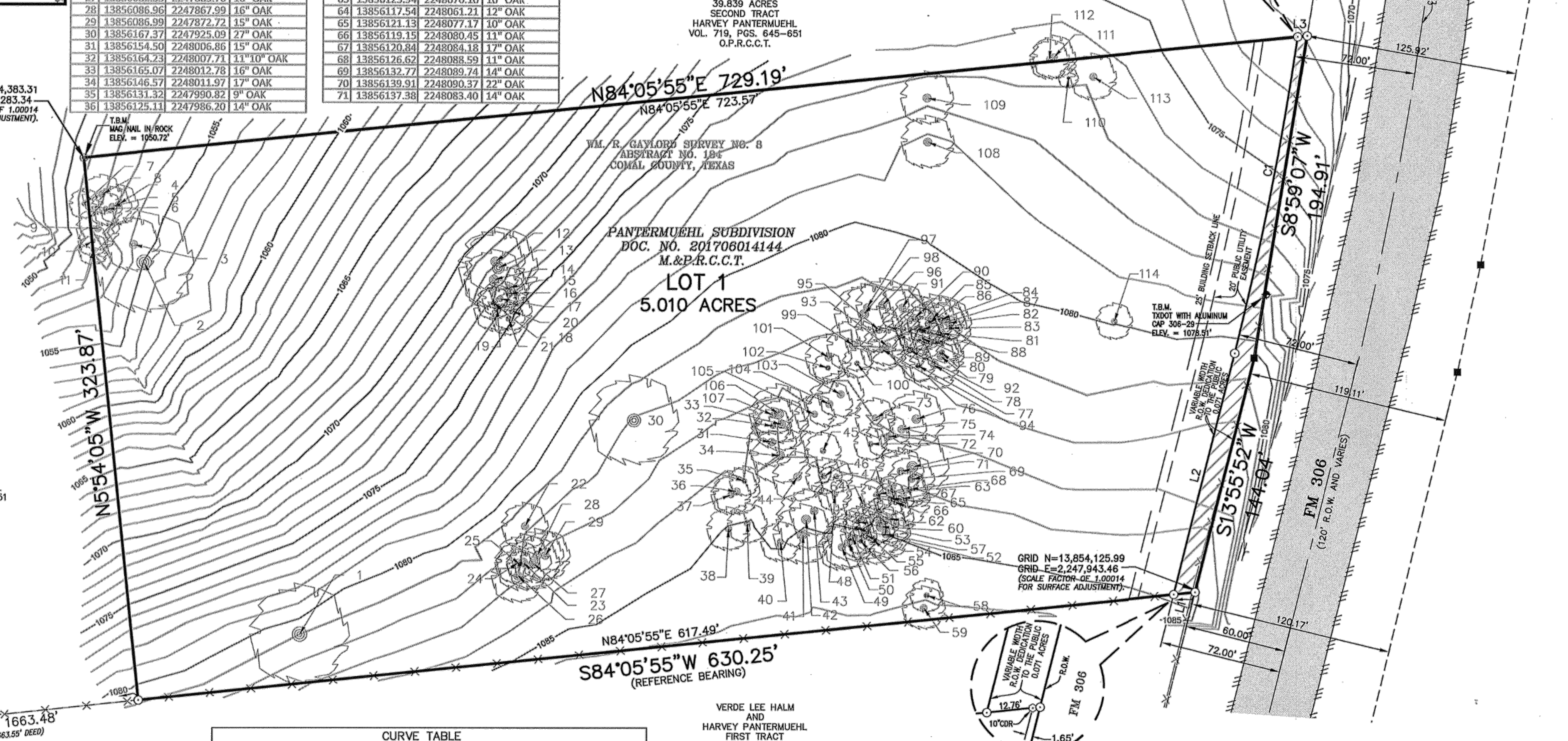
SCALE: 1"=2000'

TAG NO.	NORTHING	EASTING	DESCRIPTION
1	13856040.12	2247727.02	30" 12" OAK
2	13856260.81	2247633.98	30" OAK
3	13856271.22	2247627.74	16" OAK
4	13856295.03	2247618.61	12" OAK
5	13856293.78	2247614.82	12" OAK
6	13856292.29	2247611.07	10" OAK
7	13856295.49	2247598.28	9" OAK
8	13856300.97	2247608.78	12" OAK
9	13856280.78	2247606.46	13" 11" OAK
10	13856273.35	2247603.62	9" OAK
11	13856268.07	2247603.89	9" OAK
12	13856261.65	2247842.47	18" OAK
13	13856258.00	2247844.30	24" OAK
14	13856250.99	2247841.70	18" OAK
15	13856246.22	2247850.72	12" OAK
16	13856243.01	2247850.56	11" OAK
17	13856239.71	2247845.52	11" OAK
18	13856237.12	2247841.66	10" OAK
19	13856234.01	2247843.70	14" OAK
20	13856232.52	2247852.67	12" OAK
21	13856227.79	2247850.51	10" OAK
22	13856104.34	2247860.60	14"14"10" OAK
23	13856082.90	2247859.63	17" OAK
24	13856082.83	2247856.76	13" OAK
25	13856081.71	2247857.68	8" OAK
26	13856074.91	2247856.47	16" OAK
27	13856082.35	2247865.70	16" OAK
28	13856086.96	2247867.99	16" OAK
29	13856086.99	2247872.72	15" OAK
30	13856167.37	2247925.09	27" OAK
31	13856154.50	2248006.86	15" OAK
32	13856164.23	2248007.71	11"10" OAK
33	13856165.07	2248012.78	16" OAK
34	13856146.57	2248011.97	17" OAK
35	13856131.32	2247990.82	9" OAK
36	13856125.11	2247986.20	14" OAK

TAG NO.	NORTHING	EASTING	DESCRIPTION
37	13856123.15	2247982.87	12" OAK
38	13856102.99	2247981.41	13" OAK
39	13856106.28	2247992.56	12" OAK
40	13856095.39	2248012.27	12" OAK
41	13856099.86	2248025.60	18" OAK
42	13856108.60	2248027.44	18" OAK
43	13856113.65	2248032.21	15" OAK
44	13856133.93	2248022.27	15" OAK
45	13856149.52	2248037.31	11" OAK
46	13856134.32	2248037.90	11" OAK
47	13856134.14	2248045.16	10" OAK
48	13856123.44	2248044.47	10" OAK
49	13856092.23	2248048.65	14" OAK
50	13856095.18	2248052.64	16" OAK
51	13856098.64	2248054.68	15" OAK
52	13856103.23	2248057.54	8" OAK
53	13856107.48	2248058.20	9" OAK
54	13856099.46	2248062.57	15" OAK
55	13856096.85	2248067.28	15" OAK
56	13856095.83	2248059.79	8" OAK
57	13856100.23	2248074.73	15" OAK
58	13856063.73	2248098.99	10" OAK
59	13856056.39	2248097.29	13"13" OAK
60	13856104.38	2248071.64	17" OAK
61	13856106.57	2248070.64	12" OAK
62	13856109.28	2248076.60	15" OAK
63	13856123.94	2248070.10	10" OAK
64	13856117.54	2248061.21	12" OAK
65	13856121.13	2248077.17	10" OAK
66	13856119.15	2248080.45	11" OAK
67	13856120.84	2248084.18	17" OAK
68	13856126.62	2248088.59	11" OAK
69	13856132.77	2248089.74	14" OAK
70	13856139.91	2248090.37	22" OAK
71	13856137.38	2248083.40	14" OAK

TAG NO.	NORTHING	EASTING	DESCRIPTION
72	13856153.64	2248065.51	10" OAK
73	13856169.17	2248068.18	12" OAK
74	13856158.11	2248075.74	13" OAK
75	13856162.43	2248083.88	15" OAK
76	13856168.49	2248092.55	17" OAK
77	13856200.40	2248093.58	10" OAK
78	13856200.92	2248103.12	15" OAK
79	13856206.07	2248106.95	14" OAK
80	13856208.53	2248107.58	10" OAK
81	13856219.78	2248106.92	18"15" OAK
82	13856225.99	2248111.30	14"11" OAK
83	13856223.01	2248112.72	7" OAK
84	13856228.35	2248107.20	14" OAK
85	13856228.15	2248101.65	15" OAK
86	13856225.69	2248099.70	13"11" OAK
87	13856222.05	2248095.74	13" OAK
88	13856222.43	2248093.10	13" OAK
89	13856216.89	2248095.57	13" OAK
90	13856229.01	2248091.51	14" OAK
91	13856235.03	2248084.00	14" OAK
92	13856209.59	2248088.63	11" OAK
93	13856212.13	2248075.44	12" OAK
94	13856210.25	2248072.12	13" OAK
95	13856221.86	2248070.28	14" OAK

TAG NO.	NORTHING	EASTING	DESCRIPTION
96	13856236.46	2248072.29	16" OAK
97	13856235.14	2248063.16	14" OAK
98	13856231.14	2248061.39	18" OAK
99	13856212.65	2248055.10	16" OAK
100	13856201.80	2248057.26	9" OAK
101	13856205.22	2248040.40	14" OAK
102	13856199.00	2248040.06	9" OAK
103	13856183.26	2248047.70	14" OAK
104	13856177.41	2248041.00	14" OAK
105	13856171.27	2248032.20	12" OAK
106	13856171.41	2248011.21	18" OAK
107	13856170.75	2248007.67	12" OAK
108	13856333.74	2248098.66	16" OAK
109	13856360.13	2248098.15	16" OAK
110	13856372.43	2248181.99	6" OAK
111	13856384.82	2248173.38	13" OAK
112	13856383.45	2248170.75	12" OAK
113	13856373.18	2248196.77	14" OAK
114	13856227.27	2248209.84	11"8" OAK



LEGEND

- 1/2" IRON ROD FOUND WITH PLASTIC CAP "URBAN CIVIL"
- 1/2" IRON PIN FOUND
- TXDOT CONRETE MONUMENT TYPE 1
- CORNER POST (SIZE NOTED)
- MAG NAIL FOUND
- M.&P.R.C.C.T. MAP AND PLAT RECORDS COMAL COUNTY TEXAS
- O.P.R.C.C.T. OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS
- R.O.W. RIGHT–OF–WAY
- EDGE OF ASPHALT
- WIRE FENCE
- PUBLIC UTILITY EASEMENT
- BUILDING SETBACK LINE
- ASPHALT
- RIGHT–OF–WAY DEDICATION TO THE PUBLIC

REMAINDER OF 39.839 ACRES SECOND TRACT HARVEY PANTERMUEHL VOL. 719, PGS. 645–651 O.P.R.C.C.T.

GENERAL NOTES

1. ALL CORNERS ARE MARKED WITH 1/2" IRON PINS WITH PLASTIC CAPS UNLESS OTHERWISE NOTED.

2. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED UPON THE TEXAS COORDINATE SYSTEM, NAD83 (NA2011), SOUTH–CENTRAL ZONE. BASED ON GPS OBSERVATIONS TO COOP CORS BASE STATION SGI1. ALL DISTANCES SHOWN HEREON ARE SURFACE DISTANCES. ALL COORDINATES WERE ADJUSTED FROM STATE PLANE GRID TO PROJECT SURFACE USING A SURFACE ADJUSTMENT SCALE FACTOR OF 1.00014.

3. THIS PROPERTY IS LOCATED IN ZONE "X", DEFINED AS AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS DEFINED BY THE FLOOD INSURANCE RATE MAP FOR COMAL COUNTY, TEXAS COMMUNITY PANEL NUMBER 48091C0280F, EFFECTIVE DATE SEPTEMBER 2, 2009, AS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

4. ALL ELEVATIONS HEIGHTS ARE DETERMINED BY GPS OBSERVATIONS FROM THE NGS CO–OPERATIVE CORS NETWORK AND A HIGH–RESOLUTION GEOID MODEL (GEOID 99). REFERENCE VERIFICATION POINT (306–22 (BM121) AND 306–23 (NAD83) OF THE TXDOT VERTICAL CONTROL STATION, COMAL COUNTY, TEXAS.
BENCHMARK (ALUMINUM TXDOT DISK) LOCATED AT THE NORTHERN EAST CORNER OF THE INTERSECTION OF F.M. 306 AND HOFFMANN LANE. ELEV=932.76, [PUBLISHED ELEV.=932.73']
GRID N: 13,838,059.68
GRID E: 2,252,182.89

5. FIELD WORK ON REFERENCED PROJECT WERE SURVEYED AND LOCATED BY URBAN CIVIL ON OCTOBER 18, 2016, NOVEMBER 8, 2016, SEPTEMBER 26, 2017 AND JULY 27, 30–31, 2018.

6. TREE NUMBERS SHOWN ARE LABELED AND MARKED ON TREE WITH NUMBERED TAG AND FLAGGING. DIAMETER OF TREES WERE MEASURED AT APPROXIMATELY 4–1/12 FEET ABOVE GROUND.

8/23/2018 3:55 PM P:\Surveying\2016\1610\03\FIELD\1610.03_5.010 Acres.dwg

CURVE TABLE						
CURVE	CHORD BEARING	CHORD	RADIUS	DELTA	LENGTH	TANGENT
C1	N10°55'42"E	192.55'	1837.76'	6°00'21"	192.64'	96.41'

LINE TABLE		
LINE	BEARING	LENGTH
L1	S84°05'55"W	12.76'
L2	N13°55'52"E	148.37'
L3	N84°05'55"E	5.62'

STATE OF TEXAS
COUNTY OF COMAL

I, the undersigned, KEITH W. WOOLEY, a Registered Professional Land Surveyor in the State of Texas, have made an on the ground field survey, under my direction and supervision, of the property legally described herein; improvements situated on the premises have been shown. This survey substantially complies with the current Texas Society of Professional Surveyors Standards and Specifications for a Category 6, Condition II Land Survey.

THIS 23rd DAY OF AUGUST, 2018 A.D.

KEITH W. WOOLEY, R.P.L.S.
TEXAS LICENSE NO. 5463
URBAN CIVIL
2461 LOOP 337
NEW BRAUNFELS, TEXAS 78130

STATE OF TEXAS REGISTERED KEITH W. WOOLEY 5463 PROFESSIONAL LAND SURVEYOR

TOPOGRAPHIC AND TREE SURVEY

OF

LOT 1, PANTERMUEHL SUBDIVISION, AS RECORDED IN DOCUMENT NUMBER 201706014144 OF THE MAP AND PLAT RECORDS OF COMAL COUNTY, TEXAS.

URBAN CIVIL
2461 LOOP 337 NEW BRAUNFELS, TEXAS 78130
PHONE (830) 606–3913 FAX (830) 625–2204
TBPE FIRM# 17233 TBPLS FIRM# 10005900

REVISIONS	
DATE	DESCRIPTION

DRAWN BY: M.H. | DATE: AUGUST 2018
CHECKED BY: K.W.W. | JOB NO.: 1610.03 NB

SHEET 1 OF 1

DVO PROJECT – 182017

BROWN REYNOLDS WATFORD ARCHITECTS
2700 EARL RUDDER FRWY SOUTH
SUITE 4000
COLLEGE STATION, TEXAS 77845
979-694-1791
WWW.BRWARCH.COM

STATE OF TEXAS JASON W. DAWSON 108125 LICENSED PROFESSIONAL ENGINEER 6-6-19

825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293 - 7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

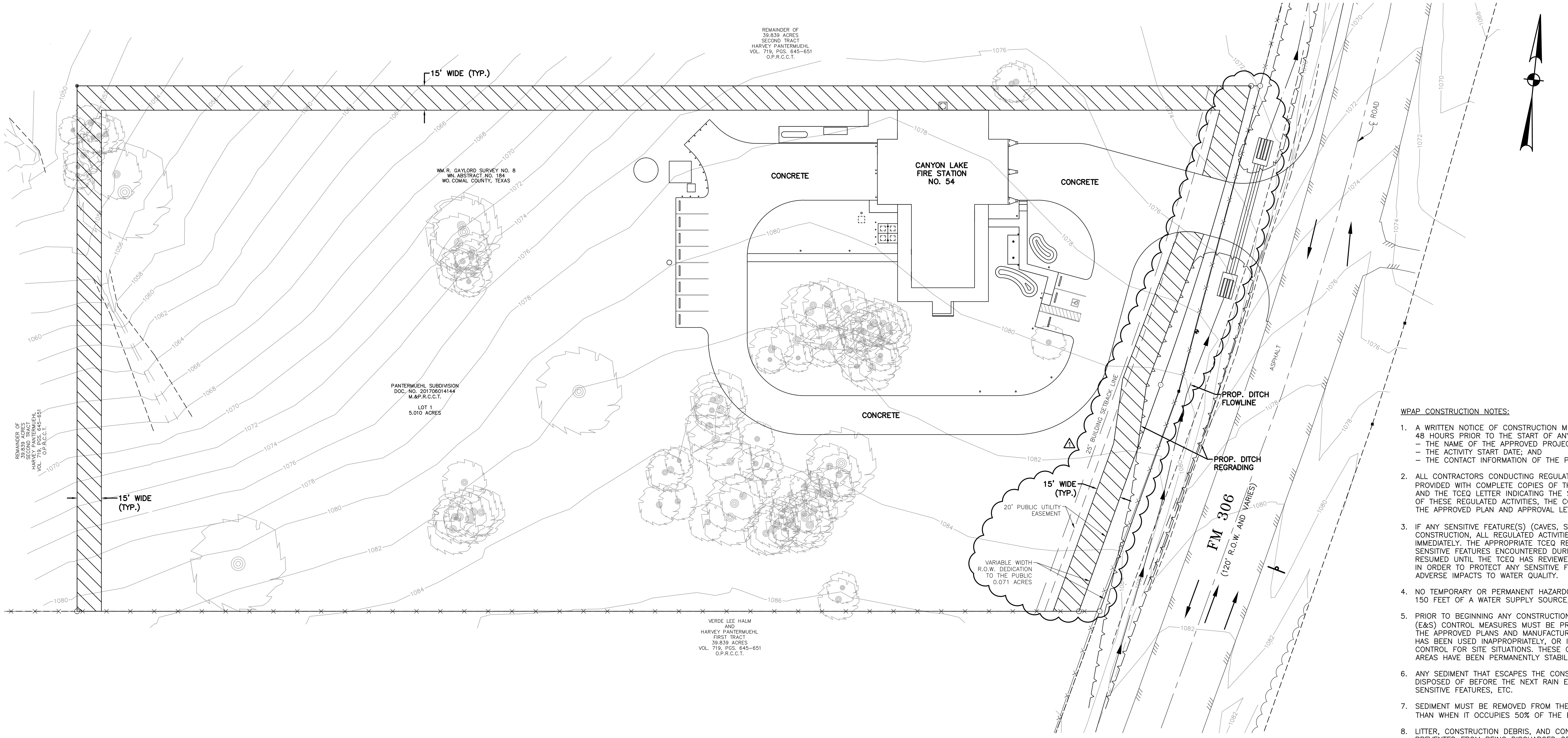
DATE	04/08/2019
DRAWN BY	
CHECKED BY	
BRW PROJECT NUMBER	218007.00

COMAL COUNTY ESD FIRE AND EMS STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

NO.	INI.	REVISION	DATE
1	JWD	POST BID ADDENDUM	06/06/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C18

TOPOGRAPHIC SURVEY (FOR REFERENCE ONLY)



30 15 0 30 60 90
SCALE IN FEET
1" = 30'

LEGEND

Symbol	Description
⊙	1/2" IRON ROD FOUND WITH PLASTIC CAP "URBAN CIVIL"
●	1/2" IRON PIN FOUND
▪	CORNER POST (SIZE NOTED)
⬡	TXDOT CONRETE MONUMENT TYPE 1
◉	MAG NAIL FOUND
M.&P.R.C.C.T.	MAP AND PLAT RECORDS COMAL COUNTY TEXAS
O.P.R.C.C.T.	OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS
R.O.W.	RIGHT–OF–WAY
	EDGE OF ASPHALT
	EXISTING WIRE FENCE
	PUBLIC UTILITY EASEMENT
	BUILDING SETBACK LINE
	EXISTING SIGN
	DIRECTION OF TRAVEL
	PROPOSED VEGETATIVE FILTER STRIPS

WPAP CONSTRUCTION NOTES:

1. A WRITTEN NOTICE OF CONSTRUCTION MUST BE SUBMITTED TO THE TCEQ REGIONAL OFFICE AT LEAST 48 HOURS PRIOR TO THE START OF ANY REGULATED ACTIVITIES. THIS NOTICE MUST INCLUDE:
   – THE NAME OF THE APPROVED PROJECT;
   – THE ACTIVITY START DATE; AND
   – THE CONTACT INFORMATION OF THE PRIME CONTRACTOR.

2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROJECT MUST BE PROVIDED WITH COMPLETE COPIES OF THE APPROVED WATER POLLUTION ABATEMENT PLAN (WPAP) AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS ARE REQUIRED TO KEEP ON–SITE COPIES OF THE APPROVED PLAN AND APPROVAL LETTER.

3. IF ANY SENSITIVE FEATURE(S) (CAVES, SOLUTION CAVITY, SINK HOLE, ETC.) IS DISCOVERED DURING CONSTRUCTION, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE APPROPRIATE TCEQ REGIONAL OFFICE MUST BE IMMEDIATELY NOTIFIED OF ANY SENSITIVE FEATURES ENCOUNTERED DURING CONSTRUCTION. CONSTRUCTION ACTIVITIES MAY NOT BE RESUMED UNTIL THE TCEQ HAS REVIEWED AND APPROVED THE APPROPRIATE PROTECTIVE MEASURES IN ORDER TO PROTECT ANY SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY.

4. NO TEMPORARY OR PERMANENT HAZARDOUS SUBSTANCE STORAGE TANK SHALL BE INSTALLED WITHIN 150 FEET OF A WATER SUPPLY SOURCE, DISTRIBUTION SYSTEM, WELL, OR SENSITIVE FEATURE.

5. PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITY, ALL TEMPORARY EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES MUST BE PROPERLY INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED PLANS AND MANUFACTURERS SPECIFICATIONS. IF INSPECTIONS INDICATE A CONTROL HAS BEEN USED INAPPROPRIATELY, OR INCORRECTLY, THE APPLICANT MUST REPLACE OR MODIFY THE CONTROL FOR SITE SITUATIONS. THESE CONTROL MUST REMAIN IN PLACE UNTIL THE DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.

6. ANY SEDIMENT THAT ESCAPES THE CONSTRUCTION SITE MUST BE COLLECTED AND PROPERLY DISPOSED OF BEFORE THE NEXT RAIN EVENT TO ENSURE IT IS NOT WASHED INTO SURFACE STREAMS, SENSITIVE FEATURES, ETC.

7. SEDIMENT MUST BE REMOVED FROM THE SEDIMENT TRAPS OR SEDIMENTATION BASINS NOT LATER THAN WHEN IT OCCUPIES 50% OF THE BASIN'S DESIGN CAPACITY.

8. LITTER, CONSTRUCTION DEBRIS, AND CONSTRUCTION CHEMICALS EXPOSED TO STORMWATER SHALL BE PREVENTED FROM BEING DISCHARGED OFFSITE.

9. ALL SPOILS (EXCAVATED MATERIAL) GENERATED FROM THE PROJECT SITE MUST BE STORED ON–SITE WITH PROPER E&S CONTROLS. FOR STORAGE OR DISPOSAL OF SPOILS AT ANOTHER SITE ON THE EDWARDS AQUIFER RECHARGE ZONE, THE OWNER OF THE SITE MUST RECEIVE APPROVAL OF A WATER POLLUTION ABATEMENT PLAN FOR THE PLACEMENT OF FILL MATERIAL OR MASS GRADING PRIOR TO THE PLACEMENT OF SPOILS AT THE OTHER SITE.

10. IF PORTIONS OF THE SITE WILL HAVE A TEMPORARY OR PERMANENT CEASE IN CONSTRUCTION ACTIVITY LONGER THAN 14 DAYS, SOIL STABILIZATION IN THOSE AREAS SHALL BE INITIATED AS SOON AS POSSIBLE PRIOR TO THE 14TH DAY OF INACTIVITY. IF ACTIVITY WILL RESUME PRIOR TO THE 21ST DAY, STABILIZATION MEASURES ARE NOT REQUIRED. IF DROUGHT CONDITIONS OR INCLEMENT WEATHER PREVENT ACTION BY THE 14TH DAY, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS POSSIBLE.

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   – THE DATES WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE; AND
   – THE DATES WHEN STABILIZATION MEASURES ARE INITIATED.

12. THE HOLDER OF ANY APPROVED EDWARD AQUIFER PROTECTION PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING.

   A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY WATER POLLUTION ABATEMENT STRUCTURE(S), INCLUDING BUT NOT LIMITED TO PONDS, DAMS, BERMS, SEWAGE TREATMENT PLANTS, AND DIVERSIONARY STRUCTURES;

   B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH WAS ORIGINALLY APPROVED OR A CHANGE WHICH WOULD SIGNIFICANTLY IMPACT THE ABILITY OF THE PLAN TO PREVENT POLLUTION OF THE EDWARDS AQUIFER;

   C. ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED AS UNDEVELOPED IN THE ORIGINAL WATER POLLUTION ABATEMENT PLAN.

AUSTIN REGIONAL OFFICE 12100 PARK 35 CIRCLE, BUILDING A AUSTIN, TEXAS 78753–1808 PHONE (512) 339–2929 FAX (512) 339–3795	SAN ANTONIO REGIONAL OFFICE 14250 JUDSON ROAD SAN ANTONIO, TEXAS 78233–4480 PHONE (210) 490–3096 FAX (210) 545–4329

DVO PROJECT – 182017

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WWW.DVOENG.COM
REGISTRATION NO. F-8334

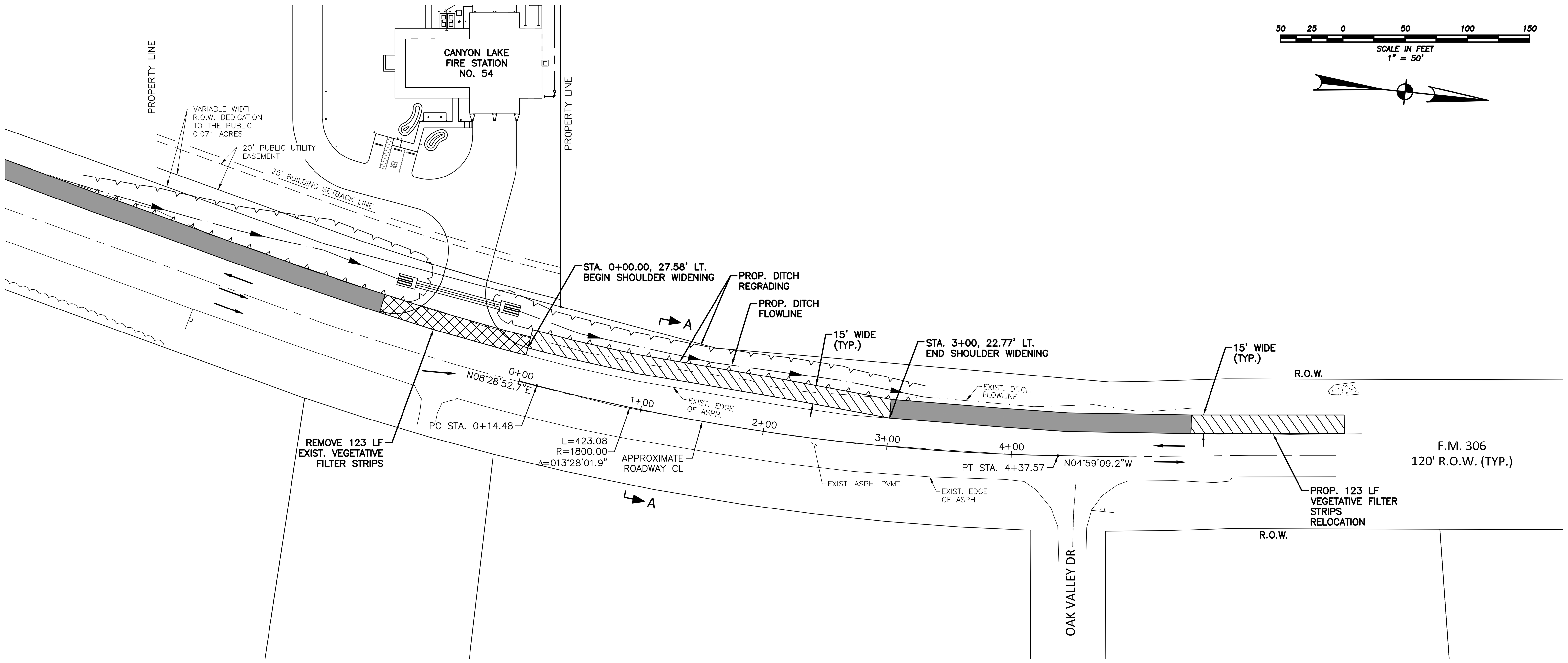
DATE	04/08/2019
DRAWN BY	
CHECKED BY	
BRW PROJECT NUMBER	218007.00

COMAL COUNTY ESD
FIRE AND EMS
STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

NO.	INI.	REVISION	DATE
1	JWD	PERMIT REVISIONS	07/12/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C19

WPAP PERMANENT
BMP PLAN
FIRE STATION NO. 54



LEGEND	
— — — —	PUBLIC UTILITY EASEMENT
——— ———	BUILDING SETBACK LINE
	EXISTING SIGN
	DIRECTION OF TRAVEL
	EXISTING VEGETATIVE FILTER STRIPS
	PROPOSED VEGETATIVE FILTER STRIPS

BENCHMARK:
ALUMINUM TXDOT DISK LOCATED AT THE NORTHERN EAST CORNER OF THE INTERSECTION OF F.M. 306 AND HOFFMAN LANE.
ELEV.=932.76, [PUBLISHED ELEV.=932.73']
GRID N=13,838,059.68, GRID E=2,252,182.89
(SCALE FACTOR OF 1.00014 FOR SURFACE ADJ.)

FLOODPLAIN:
THIS TRACT IS LOCATED IN UNSHADED ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS SHOWN ON FLOOD INSURANCE RATE MAP FOR COMAL COUNTY, TEXAS COMMUNITY PANEL NUMBER 48091C0280F, EFFECTIVE DATE SEPTEMBER 2, 2009 AS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

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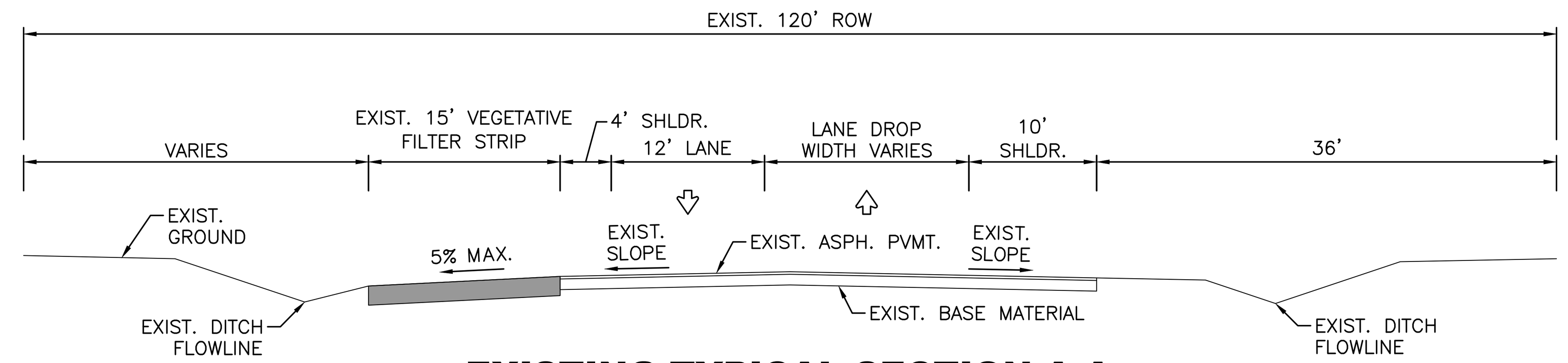
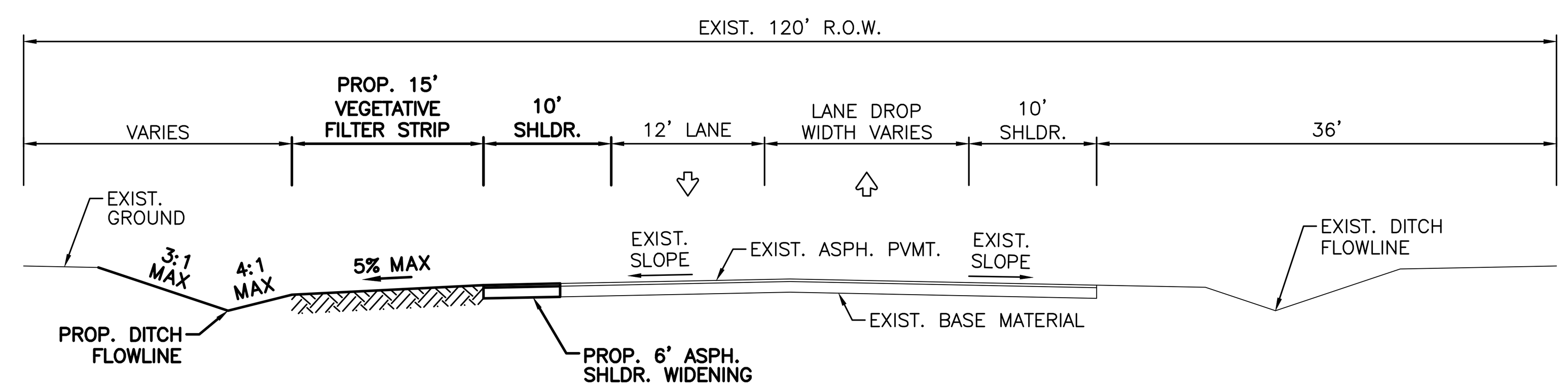


EXISTING TYPICAL SECTION A-A

NTS



PROPOSED SHOULDER WIDENING TYPICAL SECTION A-A

NTS

DVO PROJECT - 182017

BROWN REYNOLDS WATFORD ARCHITECTS
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NO.	INI.	REVISION	DATE
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C20

WPAP PERMANENT
BMP PLAN
F.M. 306

5. Temporary Stormwater Section (TCEQ-0602)

Temporary Stormwater Section

Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(b)(4)(A), (B), (D)(I) and (G); Effective June 1, 1999

To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.

Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.

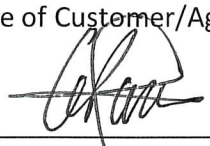
Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Temporary Stormwater Section** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

Print Name of Customer/Agent: Carlos Pacas

Date: 07/16/19

Signature of Customer/Agent:



Regulated Entity Name: Comal County ESD No. 3 Fire Station 54

Project Information

Potential Sources of Contamination

Examples: Fuel storage and use, chemical storage and use, use of asphaltic products, construction vehicles tracking onto public roads, and existing solid waste.

1. Fuels for construction equipment and hazardous substances which will be used during construction:

   [X] The following fuels and/or hazardous substances will be stored on the site: diesel and/or unleaded gas

   These fuels and/or hazardous substances will be stored in:

   [X] Aboveground storage tanks with a cumulative storage capacity of less than 250 gallons will be stored on the site for less than one (1) year.

☐ Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.

☐ Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An Aboveground Storage Tank Facility Plan application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.

☐ Fuels and hazardous substances will not be stored on the site.

2. ☒ **Attachment A - Spill Response Actions**. A site specific description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is attached.

3. ☒ Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.

4. ☒ **Attachment B - Potential Sources of Contamination**. A description of any activities or processes which may be a potential source of contamination affecting surface water quality is attached.

Sequence of Construction

5. ☒ **Attachment C - Sequence of Major Activities**. A description of the sequence of major activities which will disturb soils for major portions of the site (grubbing, excavation, grading, utilities, and infrastructure installation) is attached.

   ☒ For each activity described, an estimate (in acres) of the total area of the site to be disturbed by each activity is given.

   ☒ For each activity described, include a description of appropriate temporary control measures and the general timing (or sequence) during the construction process that the measures will be implemented.

6. ☒ Name the receiving water(s) at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project: N/A

Temporary Best Management Practices (TBMPs)

Erosion control examples: tree protection, interceptor swales, level spreaders, outlet stabilization, blankets or matting, mulch, and sod. Sediment control examples: stabilized construction exit, silt fence, filter dikes, rock berms, buffer strips, sediment traps, and sediment basins. Please refer to the Technical Guidance Manual for guidelines and specifications. All structural BMPs must be shown on the site plan.

7. ☒ **Attachment D – Temporary Best Management Practices and Measures**. TBMPs and measures will prevent pollution of surface water, groundwater, and stormwater. The construction-phase BMPs for erosion and sediment controls have been designed to retain sediment on site to the extent practicable. The following information is attached:

- [X] A description of how BMPs and measures will prevent pollution of surface water, groundwater or stormwater that originates upgradient from the site and flows across the site.
- [X] A description of how BMPs and measures will prevent pollution of surface water or groundwater that originates on-site or flows off site, including pollution caused by contaminated stormwater runoff from the site.
- [X] A description of how BMPs and measures will prevent pollutants from entering surface streams, sensitive features, or the aquifer.
- [X] A description of how, to the maximum extent practicable, BMPs and measures will maintain flow to naturally-occurring sensitive features identified in either the geologic assessment, TCEQ inspections, or during excavation, blasting, or construction.

8. [X] The temporary sealing of a naturally-occurring sensitive feature which accepts recharge to the Edwards Aquifer as a temporary pollution abatement measure during active construction should be avoided.

   - [ ] **Attachment E - Request to Temporarily Seal a Feature**. A request to temporarily seal a feature is attached. The request includes justification as to why no reasonable and practicable alternative exists for each feature.
   - [X] There will be no temporary sealing of naturally-occurring sensitive features on the site.

9. [X] **Attachment F - Structural Practices**. A description of the structural practices that will be used to divert flows away from exposed soils, to store flows, or to otherwise limit runoff discharge of pollutants from exposed areas of the site is attached. Placement of structural practices in floodplains has been avoided.

10. [X] **Attachment G - Drainage Area Map**. A drainage area map supporting the following requirements is attached:

    - [ ] For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin will be provided.
    - [ ] For areas that will have more than 10 acres within a common drainage area disturbed at one time, a smaller sediment basin and/or sediment trap(s) will be used.
    - [ ] For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin or other equivalent controls are not attainable, but other TBMPs and measures will be used in combination to protect down slope and side slope boundaries of the construction area.
    - [ ] There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. A smaller sediment basin and/or sediment trap(s) will be used in combination with other erosion and sediment controls within each disturbed drainage area.

[X] There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. Erosion and sediment controls other than sediment basins or sediment traps within each disturbed drainage area will be used.

11. [ ] **Attachment H - Temporary Sediment Pond(s) Plans and Calculations**. Temporary sediment pond or basin construction plans and design calculations for a proposed temporary BMP or measure have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information must be signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed temporary BMPs and measures are attached.

    [X] N/A

12. [X] **Attachment I - Inspection and Maintenance for BMPs.** A plan for the inspection of each temporary BMP(s) and measure(s) and for their timely maintenance, repairs, and, if necessary, retrofit is attached. A description of the documentation procedures, recordkeeping practices, and inspection frequency are included in the plan and are specific to the site and/or BMP.

13. [X] All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections by the applicant or the executive director, or other information indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations.

14. [X] If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).

15. [X] Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake will be provided that can indicate when the sediment occupies 50% of the basin volume.

16. [X] Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).

Soil Stabilization Practices

Examples: establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, or preservation of mature vegetation.

17. [X] **Attachment J - Schedule of Interim and Permanent Soil Stabilization Practices**. A schedule of the interim and permanent soil stabilization practices for the site is attached.

18. [X] Records must be kept at the site of the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.

19. [X] Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

Administrative Information

20. [X] All structural controls will be inspected and maintained according to the submitted and approved operation and maintenance plan for the project.

21. [X] If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.

22. [X] Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.

Attachment A – Spill Response Actions

Spill Response Actions

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

1. Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills. Employees should also be aware of when spill must be reported to the TCEQ. Information available in 30 TAC 327.4 and 40 CFR 302.4.
2. Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
3. Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
4. Establish a continuing education program to indoctrinate new employees.
5. Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

1. To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
2. Store hazardous materials and wastes in covered containers and protect from vandalism.
3. Place a stockpile of spill cleanup materials where it will be readily accessible.
4. Train employees in spill prevention and cleanup.
5. Designate responsible individuals to oversee and enforce control measures.
6. Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise cleanup activities.
7. Do not bury or wash spills with water.
8. Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
9. Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with applicable regulations.
10. Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
11. Place Material Safety Data Sheets (MSDS), as well as proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
12. Keep waste storage areas clean, well-organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

1. Clean up leaks and spills immediately.
2. Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be disposed of as hazardous waste.
3. Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

1. Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
2. Use absorbent materials on small spills rather than hosing down or burying the spill.
3. Absorbent materials should be promptly removed and disposed of properly.
4. Follow the practice below for a minor spill:
    a. Contain the spread of the spill.
    b. Recover spilled materials.
    c. Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities. Spills should be cleaned up immediately:

1. Contain spread of the spill.
2. Notify the project foreman immediately.
3. If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
4. If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
5. If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

For significant or hazardous spills that are in reportable quantities:

1. Notify the TCEQ by telephone as soon as possible and within 24 hours at 512-339-2929 (Austin) or 210-490-3096 (San Antonio) between 8 AM and 5 PM. After hours, contact the Environmental Release Hotline at 1-800-832-8224. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
2. For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
3. Notification should first be made by telephone and followed up with a written report.

4. The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
5. Other agencies which may need to be consulted include, but are not limited to, the City Police Department, County Sheriff Office, Fire Departments, etc.

Attachment B – Potential Sources of Contamination

Potential Sources of Contamination

The anticipated primary potential pollutants are sediment and concrete products. Other potential pollutants include vehicle fluids and trash.

Potential sources of sediments to stormwater runoff:

- Soil disturbing activities will include clearing, preparation of the ROW, grading, driveway culvert installation, and excavation for utility installation.

Potential pollutant and sources, other than sediment, to stormwater runoff:

MATERIAL	STORM WATER POLLUTANTS	LOCATION
Concrete washout	Sediment, calcium carbonate	Concrete washout/installation areas
Lime Slurry	Calcium carbonate	Roadway ROW
Lubricant	Hydrocarbons	Equipment parking area
Fuel	Hydrocarbons	Equipment parking area
Coolant	Organic compounds	Equipment parking area
Trash	Floatables	Roadway ROW
Portable toilet fluids	Bacteria	Break station
Cleaning supplies/solvents	Detergents, organic compounds	Equipment washing area
Paint	Organic compounds, metals	Storage areas/application areas
Fertilizers	Nutrients	Storage areas/seeding locations
Wood	Floatables	Roadway ROW
Steel	Metals	Laydown areas
Sealants	Organic compounds	Storage areas

Attachment C – Sequence of Major Activities

Sequence of Major Activities

1. Send Notice of Intent to TCEQ at least 48 hours prior to commencement of construction (no site acreage disturbed).

2. Post site notice at the project site and install all erosion control BMPs as indicated in the Storm Water Pollution Prevention Plan (SW3P) and manufacturer specifications, including reinforced filter fabric barrier, filter fabric fence, filter dam, and stabilized construction access (no site acreage disturbed).

3. Install all applicable barricades, work zone pavement markings, warning signs, and channelizing devices for shoulder widening. Maintain all erosion control BMPs during construction. (less than 1 acre disturbed).

4. Construct proposed driveway and 24" driveway culvert per plans and details provided. Maintain all erosion control BMPs during construction. (approximately 0.5 acres disturbed)

5. Install all utility lines on site in accordance to the construction plans and details provided, including water and septic systems. (approximately 1 acre disturbed)

6. Perform all grading and paving operations to finished grade. Maintain all erosion control BMPs during construction. (approximately 1.5 acres disturbed)

7.Install all permanent signs and pavement markings in accordance with the construction plans and details provided. Maintain all erosion control BMPs during construction. (no additional acreage disturbed)

8. Construct foundations and fire station building. Maintain all erosion control BMPs during construction. (approximately 1.5 acres disturbed)

9. Clean up project site and ROW. Maintain all erosion control BMPs during construction. (no additional acreage disturbed)

10. Restore disturbed areas (via seeding and planting stabilization practices) and remove temporary erosion control BMPs including reinforced filter fabric barrier, filter fabric fence, filter dam, and stabilized construction access. (no additional acreage disturbed)

Attachment D – Temporary Best Management Practices and Measures

Temporary Best Management Practices and Measures

Reinforced filter fabric barrier, filter fabric fence, filter dam, and stabilized construction access will be used on-site to prevent sediment from dispersing off-site. The reinforced filter fabric barrier will be used on the downstream portion of the roadside ditch where the proposed driveway construction will take place. The sediment deposits will be removed once the silt reaches one-third of the height of the fence in depth.

The filter fabric fence will be placed around the northern and eastern limits of the areas that will get disturbed during construction. It will also be placed around the safety-end treatments once the proposed driveway culvert is constructed. The sediment caught in the fence will also be removed once the silt depth reaches one-third of the height of the fence.

The filter dam will be non-reinforced and placed at the downstream end of the existing roadside ditch on FM 306, north of the project site. The filter dam is composed of granular fill that will filter sediment from the flow of the runoff.

The stabilized construction access is located at the proposed driveway, which will catch any sediment or trash that is picked up from the tires of construction trucks prior to entering the public road.

The temporary BMPs described above will prevent pollutants from entering surface streams or the aquifer. There are no sensitive features identified in the geologic assessment (see General Information Form) that requires protection or mitigation pursuant to TCEQ regulations (30 TAC 213). If any subsurface voids are encountered during site development, work will halt immediately so that a geologist may assess the potential for the void(s) to provide meaningful contribution to the Edwards Aquifer.

Attachment F – Structural Practices

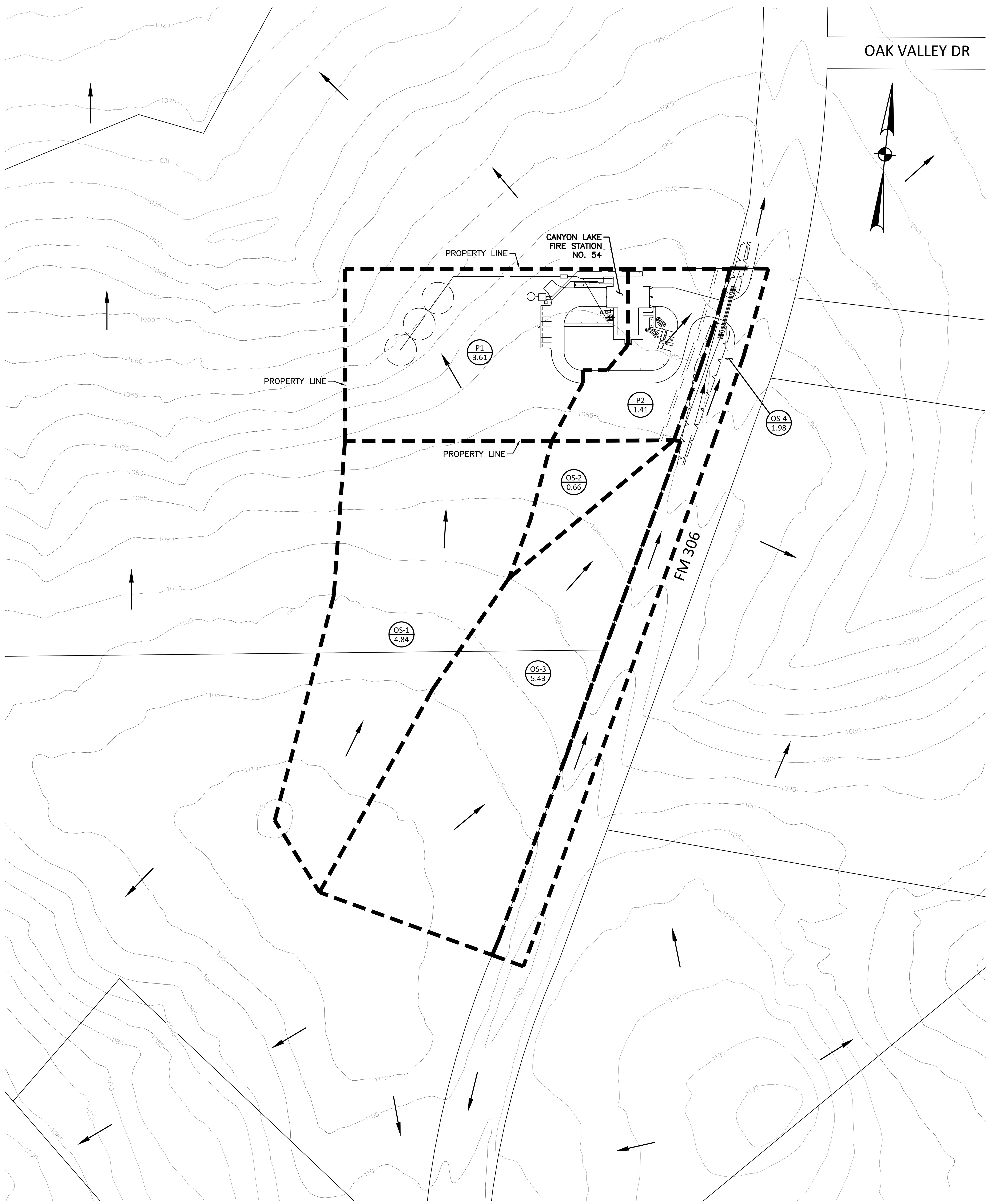
Structural Practices

Reinforced filter fabric barriers will be used to remove sediments from runoff from overland flows prior to reaching a stormwater conveyance.

A vehicle/equipment wash area, stabilized with coarse aggregate or approved substitute will be established near the staging/parking area for trucks and equipment leaving the site.

Placement of structural practices in floodplains has been avoided. Per the FEMA Flood Insurance Rate Map (FIRM) for Comal County, this tract is located in unshaded zone “X”, areas determined to be outside the 0.2% annual chance floodplain.

Attachment G – Drainage Area Map



30 15 0 30 60 90

SCALE IN FEET
1" = 30'

BENCHMARK:
ALUMINUM TXDOT DISK LOCATED AT THE NORTHERN EAST CORNER OF THE INTERSECTION OF F.M. 306 AND HOFFMAN LANE.
ELEV.=932.76, [PUBLISHED ELEV.=932.73']
GRID N=13,838,059.68, GRID E=2,252,182.89
(SCALE FACTOR OF 1.00014 FOR SURFACE ADJ.)

FLOODPLAIN:
THIS TRACT IS LOCATED IN UNSHADED ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS SHOWN ON FLOOD INSURANCE RATE MAP FOR COMAL COUNTY, TEXAS COMMUNITY PANEL NUMBER 48091C0280F, EFFECTIVE DATE SEPTEMBER 2, 2009 AS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

Rainfall Intensity-Duration-Frequency Coefficients for Texas

Based on United States Geological Survey (USGS) Scientific Investigations Report 2004–5041
"Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas"

1. Select English or SI Units: English

2. Select or Enter a County: Comal

3. Enter a Time of Conc. Select Units: 10 min

Coefficient	50% (2-year)	20% (5-year)	10% (10-year)	4% (25-year)	2% (50-year)	1% (100-year)
e	0.8305	0.8168	0.816	0.81	0.8111	0.8129
b (in.)	62.99	78.06	92.64	108.83	128.59	150.24
d (min)	11.85	11.98	12.79	12.97	13.77	14.82
Intensity (in./hr)	4.86	6.26	7.23	8.59	9.84	11.04

(Spreadsheet Release Date: August 31, 2015; data table reshuffle by Asquith July 14, 2016)

LEGEND

SYMBOL	DESCRIPTION
P1 / X.XX	DRAINAGE AREA DESIGNATION / DRAINAGE AREA (ACRES)
X.XX / X.XX	2-YEAR FLOW (C.F.S.) / 100-YEAR FLOW (C.F.S.)
(hatch)	TXDOT FRONTAGE DRAINAGE AREA (1.18 AC.)
(dashed line)	DRAINAGE AREA BOUNDARY
(arrow)	DRAINAGE PATTERN

DRAINAGE NOTES:

1. EXISTING CONTOUR DATA OBTAINED FROM DATA AVAILABLE TO PUBLIC BY COMAL COUNTY WEBSITE.
2. TOPOGRAPHIC SURVEY OBTAINED WAS LIMITED TO THE PROJECT TRACT AND FRONTAGE ALONG PUBLIC RIGHT-OF-WAY.

1

PROJECT SITE - PROPOSED PEAK FLOW CALCULATIONS (Q = C*i*A)

DA Name	Impervious Area (AC)	Total Area (AC)	Runoff Coefficient (C)	Q (2-year) (cfs)	Q (5-year) (cfs)	Q (10-year) (cfs)	Q (25-year) (cfs)	Q (50-year) (cfs)	Q (100-year) (cfs)
P1*	0.411	3.61	0.54	9.42	12.13	14.01	16.64	19.06	21.39
P2*	0.391	1.41	0.60	4.14	5.33	6.15	7.31	8.38	9.40
OS-1	0	4.84	0.49	11.53	14.85	17.15	20.37	23.34	26.18
OS-2	0	0.66	0.49	1.57	2.02	2.34	2.78	3.18	3.57
			TOTAL	**26.65**	**34.33**	**39.65**	**47.10**	**53.96**	**60.54**

*Weighed Runoff Coefficient

DRIVEWAY CULVERT - PROPOSED PEAK FLOW CALCULATIONS (Q = C*i*A)

DA Name	Impervious Area (AC)	Total Area (AC)	Runoff Coefficient (C)	Q (2-year) (cfs)	Q (5-year) (cfs)	Q (10-year) (cfs)	Q (25-year) (cfs)	Q (50-year) (cfs)	Q (100-year) (cfs)
P2*	0.391	1.41	0.60	4.14	5.33	6.15	7.31	8.38	9.40
OS-2	0	0.66	0.49	1.57	2.02	2.34	2.78	3.18	3.57
OS-3	0	5.43	0.49	12.93	16.66	19.24	22.86	26.18	29.37
OS-4*	1.002	1.98	0.67	6.47	8.33	9.62	11.43	13.10	14.69
			TOTAL	**25.11**	**32.34**	**37.35**	**44.38**	**50.84**	**57.04**

*Weighed Runoff Coefficient

Intensity (i) (in/hr)			4.86	6.26	7.23	8.59	9.84	11.04

Intensity based on a minimum time of concentration of 10 minutes (TxDOT Hydraulic Design Manual)

		Runoff Coefficients (C)	Source:
C=	0.49	Existing Rural Watershed	City of Bulverde Storm Drainage Design Criteria Manual
C=	0.49	Existing Roadside Ditch (30' Wide)	City of Bulverde Storm Drainage Design Criteria Manual
C=	0.85	Existing Asphalt Road (25' Wide)	TxDOT Hydraulic Design Criteria
C=	0.90	Proposed Concrete Pavement	TxDOT Hydraulic Design Criteria

Existing Runoff to TxDOT R.O.W from Site (Drainage Area E2)

AEP	50% (2-year)	20% (5-year)	10% (10-year)	4% (25-year)	2% (50-year)	1% (100-year)
C	0.49	0.49	0.49	0.49	0.49	0.49
I (in/hr)	4.86	6.26	7.23	8.59	9.84	11.04
A (acres)	1.85	1.85	1.85	1.85	1.85	1.85
Q_{exist} (cfs)	**4.41**	**5.67**	**6.55**	**7.79**	**8.92**	**10.01**

Proposed Runoff to TxDOT R.O.W from Site (Drainage Area P2)

AEP	50% (2-year)	20% (5-year)	10% (10-year)	4% (25-year)	2% (50-year)	1% (100-year)
C	**0.60**	**0.60**	**0.60**	**0.60**	**0.60**	**0.60**
I (in/hr)	4.86	6.26	7.23	8.59	9.84	11.04
A (acres)	1.41	1.41	1.41	1.41	1.41	1.41
Q_{prop} (cfs)	**4.11**	**5.30**	**6.12**	**7.27**	**8.32**	**9.34**

Used minimum time of concentration of 10 minutes (TxDOT Hydraulic Design Manual)
Intensity Values based on TxDOT IDF Data Sheet
AEP = Annual Exceedence Probability

DVO PROJECT – 182017

BROWN REYNOLDS WATFORD ARCHITECTS
2700 EARL RUDDER FRWY SOUTH
SUITE 4000
COLLEGE STATION, TEXAS 77845
979-694-1791
WWW.BRWARCH.COM

STATE OF TEXAS
JASON W. DAWSON
108125
LICENSED
PROFESSIONAL ENGINEER
6-6-19

DVO
825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293-7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

DATE	04/08/2019
DRAWN BY	
CHECKED BY	
BRW PROJECT NUMBER	218007.00

COMAL COUNTY ESD FIRE AND EMS STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

CANYON LAKE EST 1964 FIRE / EMS

NO.	INI.	REVISION	DATE
1	JWD	POST BID ADDENDUM	06/06/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C9

PROPOSED DRAINAGE PLAN

Attachment I – Inspection and Maintenance for BMPs

Inspection and Maintenance for BMPs

Inspection requirements are outlined in the Stormwater Pollution Prevention Plan (SW3P). For areas of the construction site that have not been finally stabilized, areas used for storage of materials, structural control measures, and stabilized construction access point, personnel provided by the permittee and familiar with the SW3P will inspect disturbed areas at least once every 14 calendar days and within 24 hours of the end of a storm of 0.5 inches or greater. As an alternative to the above-described inspection schedule, these inspections will occur at least once every 7 calendar days.

The contractor will designate a qualified person(s) to perform the following inspections:

- Disturbed areas and areas used for storage of materials that are exposed to precipitation will be inspected for evidence of, or the potential for, pollutants entering the drainage system.
- Erosion and sediment control measures identified in the plan will be observed to ensure that they are operating correctly.
- Where discharge locations or points are accessible, they will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receiving waters.
- Locations where vehicles enter or exit the site will be inspected for evidence of off-site sediment tracking.
- The vehicle/equipment wash area will be inspected for loss of aggregate, proper drainage, and proper maintenance of equipment.

Attachment J – Schedule of Interim and Permanent Soil Stabilization Practices

Schedule of Interim and Permanent Soil Stabilization Practices

This schedule is as included in the Storm Water Pollution Prevention Plan (SW3P)

1. Install sediment barriers and stabilized construction entrance/exists. Stabilized construction access point will be provided using coarse aggregate or approved substitute.

2. The on-site staging and parking area will be stabilized using coarse aggregate or approved substitute.

3. In completed pavement sections, all disturbed land within the ROW will be stabilized with sod to minimize erosion and sediment as soon as possible.

4. At the end of the paving work, all disturbed areas that are not paved will be planted with sod.

5. Remove temporary erosion controls when the site is stabilized.

6. Install vegetative filter strips in accordance to construction plans and details provided.

6. Permanent Stormwater Section (TCEQ-0600)

Permanent Stormwater Section

Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(b)(4)(C), (D)(Ii), (E), and (5), Effective June 1, 1999

To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.

Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.

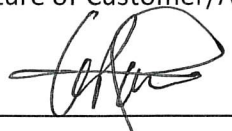
Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Permanent Stormwater Section** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

Print Name of Customer/Agent: Carlos Pacas

Date: 07/16/19

Signature of Customer/Agent



Regulated Entity Name: Comal County ESD No. 3 Fire Station 54

Permanent Best Management Practices (BMPs)

Permanent best management practices and measures that will be used during and after construction is completed.

1. [X] Permanent BMPs and measures must be implemented to control the discharge of pollution from regulated activities after the completion of construction.

   [ ] N/A

2. [X] These practices and measures have been designed, and will be constructed, operated, and maintained to insure that 80% of the incremental increase in the annual mass loading of total suspended solids (TSS) from the site caused by the regulated activity is removed. These quantities have been calculated in accordance with technical guidance prepared or accepted by the executive director.

   [X] The TCEQ Technical Guidance Manual (TGM) was used to design permanent BMPs and measures for this site.

☐ A technical guidance other than the TCEQ TGM was used to design permanent BMPs and measures for this site. The complete citation for the technical guidance that was used is: _____

☐ N/A

3. ☒ Owners must insure that permanent BMPs and measures are constructed and function as designed. A Texas Licensed Professional Engineer must certify in writing that the permanent BMPs or measures were constructed as designed. The certification letter must be submitted to the appropriate regional office within 30 days of site completion.

   ☐ N/A

4. Where a site is used for low density single-family residential development and has 20 % or less impervious cover, other permanent BMPs are not required. This exemption from permanent BMPs must be recorded in the county deed records, with a notice that if the percent impervious cover increases above 20% or land use changes, the exemption for the whole site as described in the property boundaries required by 30 TAC §213.4(g) (relating to Application Processing and Approval), may no longer apply and the property owner must notify the appropriate regional office of these changes.

   ☐ The site will be used for low density single-family residential development and has 20% or less impervious cover.
   ☐ The site will be used for low density single-family residential development but has more than 20% impervious cover.
   ☒ The site will not be used for low density single-family residential development.

5. The executive director may waive the requirement for other permanent BMPs for multi-family residential developments, schools, or small business sites where 20% or less impervious cover is used at the site. This exemption from permanent BMPs must be recorded in the county deed records, with a notice that if the percent impervious cover increases above 20% or land use changes, the exemption for the whole site as described in the property boundaries required by 30 TAC §213.4(g) (relating to Application Processing and Approval), may no longer apply and the property owner must notify the appropriate regional office of these changes.

   ☐ **Attachment A - 20% or Less Impervious Cover Waiver**. The site will be used for multi-family residential developments, schools, or small business sites and has 20% or less impervious cover. A request to waive the requirements for other permanent BMPs and measures is attached.
   ☐ The site will be used for multi-family residential developments, schools, or small business sites but has more than 20% impervious cover.
   ☒ The site will not be used for multi-family residential developments, schools, or small business sites.

6. ☒ **Attachment B - BMPs for Upgradient Stormwater**.

- [X] A description of the BMPs and measures that will be used to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site is attached.
- [ ] No surface water, groundwater or stormwater originates upgradient from the site and flows across the site, and an explanation is attached.
- [ ] Permanent BMPs or measures are not required to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site, and an explanation is attached.

7. [X] **Attachment C - BMPs for On-site Stormwater**.

   - [X] A description of the BMPs and measures that will be used to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff from the site is attached.
   - [ ] Permanent BMPs or measures are not required to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff, and an explanation is attached.

8. [ ] **Attachment D - BMPs for Surface Streams**. A description of the BMPs and measures that prevent pollutants from entering surface streams, sensitive features, or the aquifer is attached. Each feature identified in the Geologic Assessment as sensitive has been addressed.

   [X] N/A

9. [X] The applicant understands that to the extent practicable, BMPs and measures must maintain flow to naturally occurring sensitive features identified in either the geologic assessment, executive director review, or during excavation, blasting, or construction.

   - [X] The permanent sealing of or diversion of flow from a naturally-occurring sensitive feature that accepts recharge to the Edwards Aquifer as a permanent pollution abatement measure has not been proposed.
   - [ ] **Attachment E - Request to Seal Features**. A request to seal a naturally-occurring sensitive feature, that includes, for each feature, a justification as to why no reasonable and practicable alternative exists, is attached.

10. [X] **Attachment F - Construction Plans**. All construction plans and design calculations for the proposed permanent BMP(s) and measures have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer, and are signed, sealed, and dated. The plans are attached and, if applicable include:

    - [X] Design calculations (TSS removal calculations)
    - [X] TCEQ construction notes
    - [X] All geologic features
    - [X] All proposed structural BMP(s) plans and specifications

    [ ] N/A

11. [X] **Attachment G - Inspection, Maintenance, Repair and Retrofit Plan**. A plan for the inspection, maintenance, repairs, and, if necessary, retrofit of the permanent BMPs and measures is attached. The plan includes all of the following:

    [X] Prepared and certified by the engineer designing the permanent BMPs and measures
    [X] Signed by the owner or responsible party
    [X] Procedures for documenting inspections, maintenance, repairs, and, if necessary retrofit
    [X] A discussion of record keeping procedures

    [ ] N/A

12. [ ] **Attachment H - Pilot-Scale Field Testing Plan**. Pilot studies for BMPs that are not recognized by the Executive Director require prior approval from the TCEQ. A plan for pilot-scale field testing is attached.

    [X] N/A

13. [ ] **Attachment I -Measures for Minimizing Surface Stream Contamination**. A description of the measures that will be used to avoid or minimize surface stream contamination and changes in the way in which water enters a stream as a result of the construction and development is attached. The measures address increased stream flashing, the creation of stronger flows and in-stream velocities, and other in-stream effects caused by the regulated activity, which increase erosion that results in water quality degradation.

    [X] N/A

Responsibility for Maintenance of Permanent BMP(s)

Responsibility for maintenance of best management practices and measures after construction is complete.

14. [X] The applicant is responsible for maintaining the permanent BMPs after construction until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property (such as without limitation, an owner's association, a new property owner or lessee, a district, or municipality) or the ownership of the property is transferred to the entity. Such entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred.

    [ ] N/A

15. [X] A copy of the transfer of responsibility must be filed with the executive director at the appropriate regional office within 30 days of the transfer if the site is for use as a multiple single-family residential development, a multi-family residential development, or a non-residential development such as commercial, industrial, institutional, schools, and other sites where regulated activities occur.

    [ ] N/A

Attachment B – BMPs for Upgradient Stormwater

BMPs for Upgradient Stormwater

The offsite flows originate from undeveloped properties south of the project site. The existing sheet flow from off-site areas runs north from an existing high point at an approximate 2-3% slope. The proposed development will not block existing sheet flow. The proposed fire station will be graded to not disrupt the existing flow patterns. Vegetative filter strips that will be placed along the northern, eastern and western boundary of the proposed site which will help filter the existing offsite sheet flow.

Vegetative filter strips will also be placed on-site west of the regraded roadside ditch to treat flows produced by the developed site and off-site areas. This will help reduce the TSS of loads of runoff that will go into TxDOT right-of-way. The existing vegetative strips on the east bank of the roadside ditch will be reconstructed at the location of the proposed shoulder widening north of the project site.

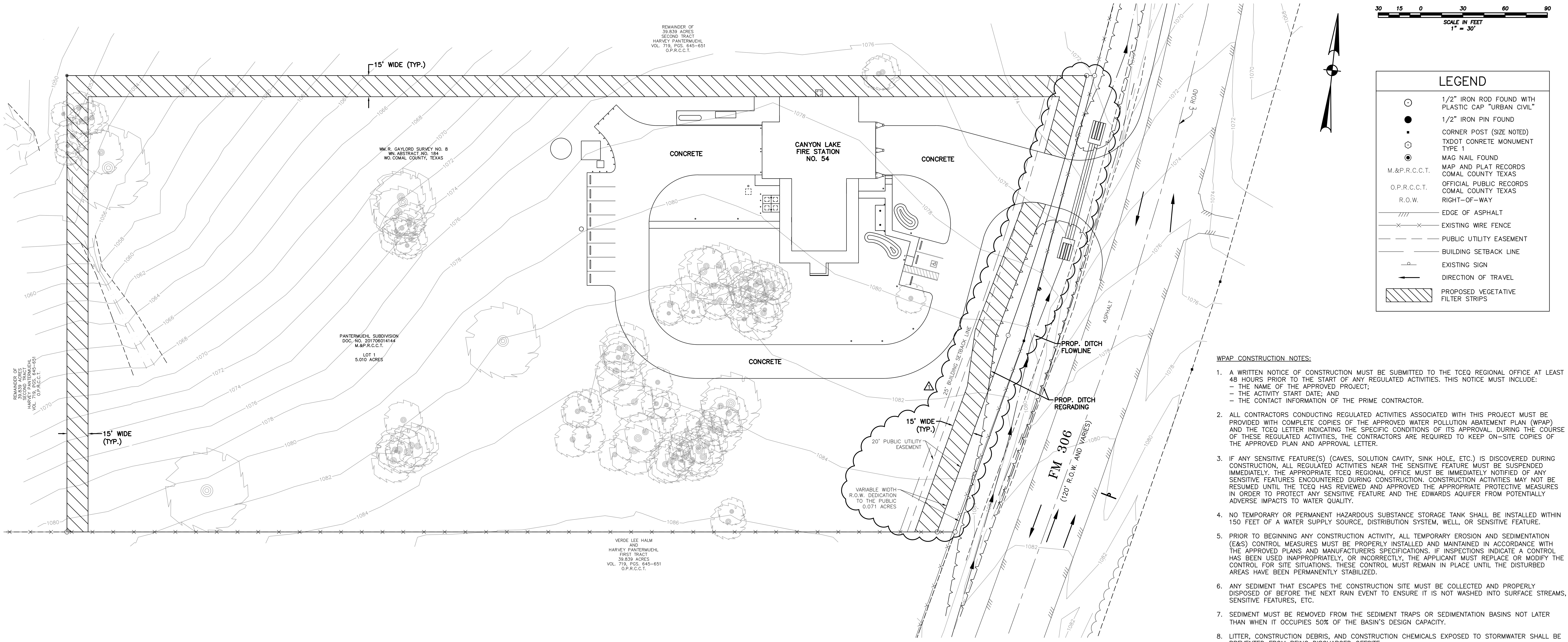
Attachment C – BMPs for On-site Stormwater

BMPs for On-site Stormwater

The 5-acre site proposes approximately 0.80 acres of impervious cover. The impervious cover is attributed to concrete paving and a fire station building. The increase in impervious cover increases runoff rates which carry on-site pollutants.

Vegetative filter strips will be constructed, operated, and maintained to remove 80% of the incremental increase in the annual mass loading of total suspended solids (TSS) from the site cause by regulated activity. According to Chapter 3 of the Edwards Aquifer Guidance Manual, vegetative filter strips can remove up to 85% of TSS in drainage areas smaller than 10 acres. The entire project site (5.010 Acres) is in the Edwards Aquifer Recharge Zone, however only 2.3 acres will see regulated activity. The entire project site receives off-site drainage from 5.50 acres and will be accounted for in the TSS removal calculations. The increase in impervious cover will require 718 lbs. of TSS removal. Vegetative filter strips around the project site will be sufficient for the required removal of TSS.

Attachment F – Construction Plans



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DVO PROJECT – 182017

BROWN REYNOLDS WATFORD ARCHITECTS
2700 EARL RUDDER FRWY SOUTH
SUITE 4000
COLLEGE STATION, TEXAS 77845
979.694.1791
WWW.BRWARCH.COM

STATE OF TEXAS
JASON W. DAWSON
108125
LICENSED PROFESSIONAL ENGINEER
6-6-19

825 TOWN & COUNTRY LANE
STE 1150
HOUSTON, TX 77024
(281) 293-7500
WWW.DVOENG.COM
REGISTRATION NO. F-8334

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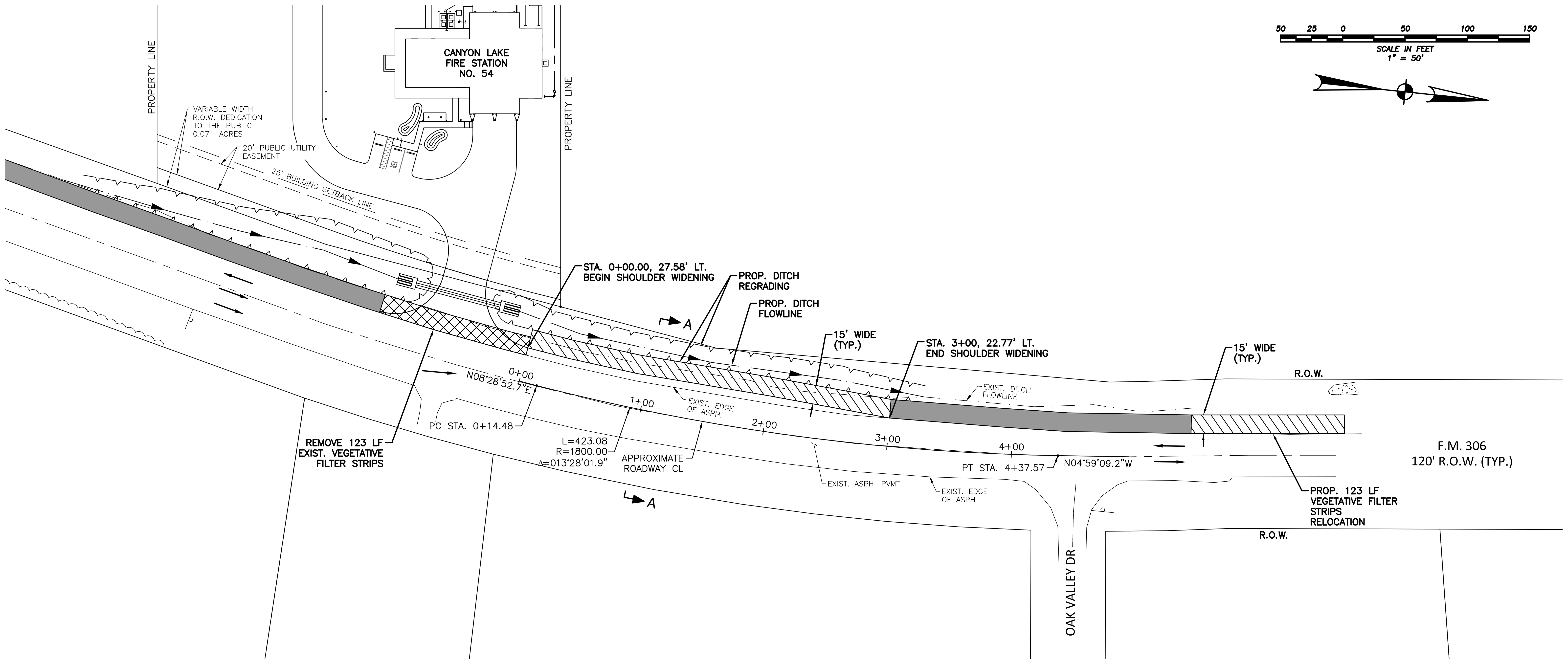
DATE	04/08/2019
DRAWN BY	
CHECKED BY	
BRW PROJECT NUMBER	218007.00

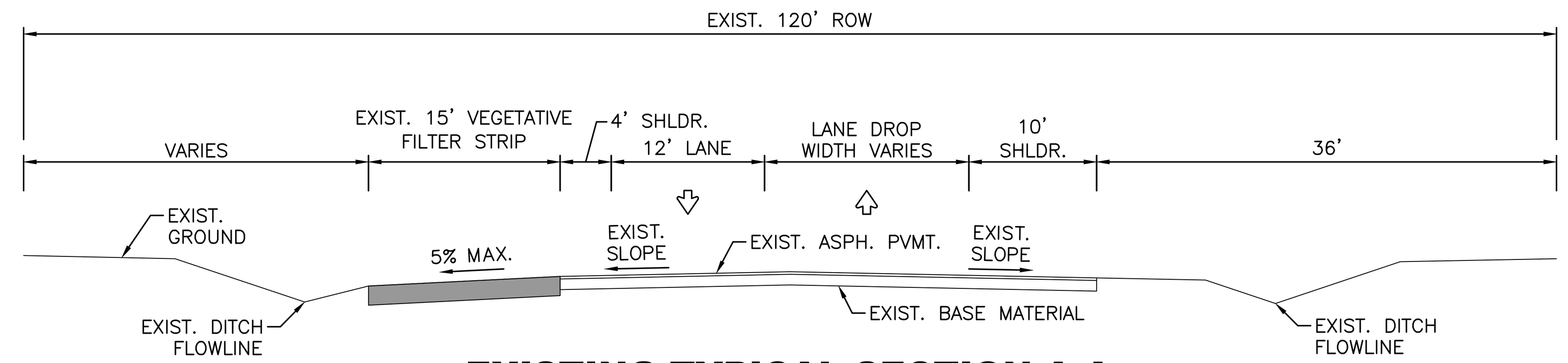
COMAL COUNTY ESD
FIRE AND EMS
STATION 54
8685 FM 306
NEW BRAUNFELS, TEXAS 78133

NO.	INI.	REVISION	DATE
1	JWD	PERMIT REVISIONS	07/12/19
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C19

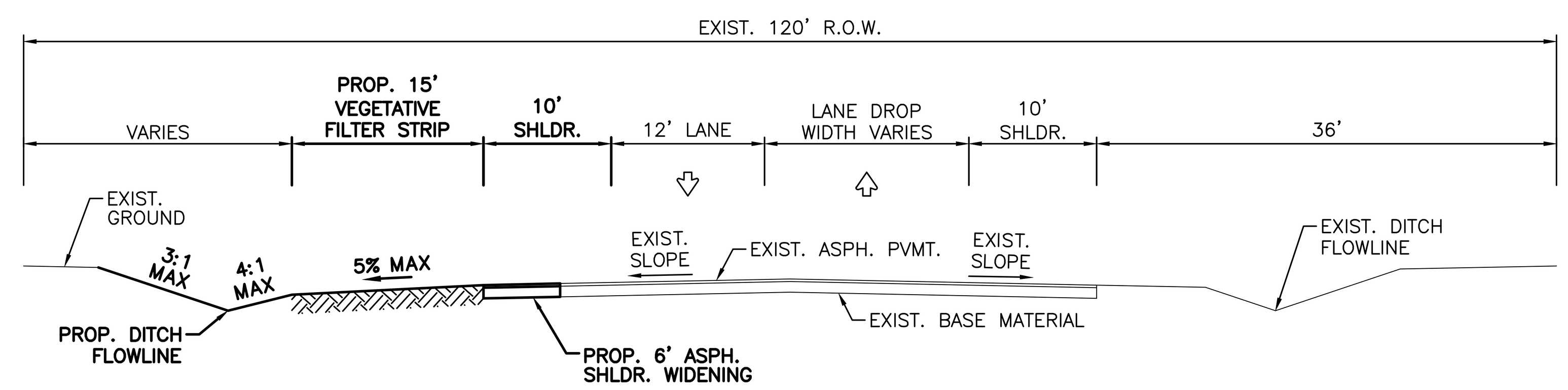
WPAP PERMANENT
BMP PLAN
FIRE STATION NO. 54





EXISTING TYPICAL SECTION A-A

NTS



PROPOSED SHOULDER WIDENING TYPICAL SECTION A-A

NTS

LEGEND

Symbol	Description
— — — —	PUBLIC UTILITY EASEMENT
——— ———	BUILDING SETBACK LINE
—o—	EXISTING SIGN
←—	DIRECTION OF TRAVEL
(solid grey)	EXISTING VEGETATIVE FILTER STRIPS
(hatched)	PROPOSED VEGETATIVE FILTER STRIPS

BENCHMARK:
ALUMINUM TXDOT DISK LOCATED AT THE NORTHERN EAST CORNER OF THE INTERSECTION OF F.M. 306 AND HOFFMAN LANE.
ELEV.=932.76, [PUBLISHED ELEV.=932.73']
GRID N=13,838,059.68, GRID E=2,252,182.89
(SCALE FACTOR OF 1.00014 FOR SURFACE ADJ.)

FLOODPLAIN:
THIS TRACT IS LOCATED IN UNSHADED ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS SHOWN ON FLOOD INSURANCE RATE MAP FOR COMAL COUNTY, TEXAS COMMUNITY PANEL NUMBER 48091C0280F, EFFECTIVE DATE SEPTEMBER 2, 2009 AS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

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NEW BRAUNFELS, TEXAS 78133

NO.	INI.	REVISION	DATE
	JWD	POST BID ADDENDUM NO. 1	07/24/19

C20

WPAP PERMANENT BMP PLAN F.M. 306

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Comal County ESD No. 3 Fire Station 54
Date Prepared: 7/11/2019

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:
$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Comal	
Total project area included in plan * =	5.00	acres
Predevelopment impervious area within the limits of the plan* =	0.00	acres
Total post-development impervious area within the limits of the pla* =	0.80	acres
Total post-development impervious cover fraction* =	0.16	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	718	lbs.

* The values entered in these fields should be for the total project area.

Number of drainage basins / outfalls areas leaving the plan area = 1

2. Drainage Basin Parameters (This information should be provided for each basin

Drainage Basin/Outfall Area No. = 1

Total drainage basin/outfall area=	5.00	acres
Predevelopment impervious area within drainage basin/outfall are =	0.00	acres
Post-development impervious area within drainage basin/outfall are =	0.80	acres
Post-development impervious fraction within drainage basin/outfall are =	0.16	
$L_{M\ THIS\ BASIN}$ =	718	lbs.

3. Indicate the proposed BMP Code for this basin

Proposed BMP = Vegetated Filter Strips
Removal efficiency = 85 percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:
A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	17.93	acres
A_I =	0.80	acres
A_P =	17.13	acres
L_R =	1036	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall are

Desired $L_{M\ THIS\ BASIN}$ = 718 lbs.

F = 0.69

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth = 0.75 inches
Post Development Runoff Coefficient = 0.07
On-site Water Quality Volume = 3471 cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP = 12.91 acres
Off-site Impervious cover draining to BMP = 0.00 acres
Impervious fraction of off-site area = 0.00
Off-site Runoff Coefficient = 0.02
Off-site Water Quality Volume = 703 cubic feet

Storage for Sediment = 835

Total Capture Volume (required water quality volume(s) x 1.20) = 5009 cubic feet

The following sections are used to calculate the required water quality volume(s) for the selected BM
The values for BMP Types not selected in cell C45 will show NA

7. Retention/Irrigation System Designed as Required in RG-348 Pages 3-42 to 3-46

Required Water Quality Volume for retention basin = NA cubic feet

Irrigation Area Calculations:

Soil infiltration/permeability rate = 0.1 in/hr **Enter determined permeability rate or assumed value of 0.1**
Irrigation area = NA square feet
NA acres

8. Extended Detention Basin System Designed as Required in RG-348 Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin = NA cubic feet

9. Filter area for Sand Filters Designed as Required in RG-348 Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin = NA cubic feet

Minimum filter basin area = NA square feet

Maximum sedimentation basin area = NA square feet **For minimum water depth of 2 fee**
Minimum sedimentation basin area = NA square feet **For maximum water depth of 8 fee**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins = NA cubic feet

Minimum filter basin area = NA square feet

Maximum sedimentation basin area = NA square feet **For minimum water depth of 2 fee**
Minimum sedimentation basin area = NA square feet **For maximum water depth of 8 fee**

10. Bioretention System Designed as Required in RG-348 Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = NA cubic feet

11. Wet Basins Designed as Required in RG-348 Pages 3-66 to 3-71

Required capacity of Permanent Pool = NA cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = NA cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands Designed as Required in RG-348 Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = NA cubic feet

13. AquaLogic™ Cartridge System Designed as Required in RG-348 Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™**

Required Sedimentation chamber capacity =	**NA**	cubic feet
Filter canisters (FCs) to treat WQV =	**NA**	cartridges
Filter basin area (RIA_F) =	**NA**	square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System =	**NA**	cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUME

15. Grassy Swales Designed as Required in RG-348 Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A =	0.00	acres
Impervious Cover in Drainage Area =	0.00	acres
Rainfall intensity = i =	1.1	in/hr
Swale Slope =	0	ft/ft
Side Slope (z) =	0	
Design Water Depth = y =	0.00	ft
Weighted Runoff Coefficient = C =	#DIV/0!	

A_{CS} = cross-sectional area of flow in Swale =	#DIV/0!	sf
P_W = Wetted Perimeter =	#DIV/0!	feet
R_H = hydraulic radius of flow cross-section = A_{CS}/P_W =	#DIV/0!	feet
n = Manning's roughness coefficient =	0.2	

15A. Using the Method Described in the RG-34

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = #DIV/0! feet

Q = CiA = #DIV/0! cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = #DIV/0! ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = #DIV/0! feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solve

Design Q = CiA = #DIV/0! cfs

Manning's Equation Q = 0.00 cfs Error 1 = #DIV/0!
Swale Width= 6.00 ft

Instructions are provided to the right (green comments)

Flow Velocity #DIV/0! ft/s
Minimum Length = #DIV/0! ft

Instructions are provided to the right (blue comments)

Design Width = 0 ft
Design Discharge = 0.00 cfs Error 2 = #DIV/0!
Design Depth = 0.33 ft
Flow Velocity = #DIV/0! cfs
Minimum Length = #DIV/0! ft

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver reru
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possibl

16. Vegetated Filter Strips Designed as Required in RG-348 Pages 3-55 to 3-57

To solve for bottom width of the trapezoidal swale (b) using the Excel solve
Excel can simultaneously solve the "Design Q" (C217) vs "Manning's Q" (C219) by varying the "Swale Width" (C22(
The required "Swale Width" occurs when the "Design Q" = "Manning's Q

First, highlight Cell F219 (Error 1 value). The equation showing in the fx screen for Cell F219 should be "= C217-C21
Then click on "Tools" and "Solver". The "Solver Parameters" screen pops up
The value in the "Set Target cell" should be F219 "Error 1 =
The value in the "By Changing Cells" should be C220 "Swale Width
Click on solve.

The resulting "Swale Width" must be less than 10 feet to meet the requirements of the TGM
If the resulting "Swale Width" exceeds 10 feet then the design parameters must be revised and the solver run agai

If there is not the option for "Solver" under "Tools"
Click on "Tools" and "Add Ins" and then check "Solver Add-in
Then proceed as instructed above

If you would like to increase the bottom width of the trapezoidal swale (b)
Excel can simultaneously solve the "Design Q" (C217) vs "Design Discharge" (C232) by varying the "Design Depth" (C23:
The required "Design Depth" for a 10-foot bottom width occurs when the "Design Q" (C217) = the "Design Discharge" (C23:

First set the desired bottom width in Cell C231.
Highlight Cell F232. The equation showing in the fx screen for Cell F232 should be "= C217-C23:

Click on "Tools" and "Solver". The "Solver Parameters" screen pops up
The value in the "Set Target cell" should be F232 "Error 2
The value in the "By Changing Cells" should be C233 "Design Depth

There are no calculations required for determining the load or size of vegetative filter strip
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) an
the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% (
across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-34

17. Wet Vaults Designed as Required in RG-348 Pages 3-30 to 3-32 & 3-79

Required Load Removal Based upon Equation 3.3 = **NA** lbs

First calculate the load removal at 1.1 in/hou

RG-348 Page 3-30 Equation 3.4: Q = CiA

C = runoff coefficient for the drainage area = 0.10 C = Runoff Coefficient = 0.546 (IC^2) + 0.328 (IC) + 0.03
i = design rainfall intensity = 1.1 in/hour
A = drainage area in acres = 1 acres

Q = flow rate in cubic feet per second = 0.11 cubic feet/sec

RG-348 Page 3-31 Equation 3.5: V_{OR} = Q/A

Q = Runoff rate calculated above = 0.11 cubic feet/sec
A = Water surface area in the wet vault = 150 square feet

V_{OR} = Overflow Rate = 0.00 feet/sec

Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) = 53 percent

Load removed by Wet Vault = #VALUE! lbs

If a bypass occurs at a rainfall intensity of less than 1.1 in/hour
Calculate the efficiency reduction for the actual rainfall intensity rat

Actual Rainfall Intensity at which Wet Vault bypass Occurs = 0.5 in/hour

Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 = 0.75 percent
Efficiency Reduction for Actual Rainfall Intensity = 0.83 percent

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete Designed as Required in RG-348 Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_3 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100$ = 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = E_1 = 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = E_2 = 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = E_3 = 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} X P X (A_I X 34.6 X A_P X 0.54)$ = 1052.65 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area= **NA** lbs
Impervious Cover Overtreatment= 0.0000 ac
TSS Removal for Uncaptured Area = 0.00 lbs

BMP Sizing

Effective Area = NA EA
Calculated Model Size(s) = #N/A
Actual Model Size (if multiple values provided in Calculate
Model Size or if you are choosing a larger model size) = 0 Model Size

Surface Area = #N/A ft^2
Overflow Rate = #VALUE! V_{or}
Rounded Overflow Rate = #VALUE! V_{or}
BMP Efficiency % = #VALUE! %

Click on solve.

The resulting "Design Depth" must be equal to or less than 0.33 feet to meet the requirements of the TGI
If the resulting "Design Depth" exceeds 0.33 feet then the design parameters must be revised and the solver run agai
First set the desired bottom width in Cell C231.
Highlight Cell F232. The equation showing in the fx screen for Cell F232 should be "= C217-C23
Click on "Tools" and "Solver". The "Solver Parameters" screen pops up
The value in the "Set Target cell" should be F232 "Error 2
The value in the "By Changing Cells" should be C233 "Design Depth
Click on solve.

The resulting "Design Depth" must be equal to or less than 0.33 feet to meet the requirements of the TGI
If the resulting "Design Depth" exceeds 0.33 feet then the design parameters must be revised and the solver run agai

L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit≥ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

21. Vortech

Required TSS Removal in BMP Drainage Area=	**NA**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs
BMP Sizing		
Effective Area =	NA	EA
Calculated Model Size(s) =	#N/A	
Actual Model Size (if choosing larger model size) =	Vx1000	Pick Model Size
Surface Area =	7.10	ft^2
Overflow Rate =	#VALUE!	V_{or}
Rounded Overflow Rate =	#VALUE!	V_{or}
BMP Efficiency % =	#VALUE!	%
L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit≥ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

Attachment G – Inspection, Maintenance, Repair and Retrofit Plan

Inspection, Maintenance, Repair and Retrofit Plan

Vegetative filter strips require a low level of maintenance. Comal County Emergency Services District No. 3 has agreed to maintain the installed vegetative filter strips in the project site. TxDOT will maintain the reconstructed vegetative filter strips in the roadside ditch along FM 306. The basic maintenance guidelines provided below are from Chapter 3 of the Edwards Aquifer Guidance Manual (Section 3.5.8)

Once a vegetated area is well established, little additional maintenance is generally necessary. The key to establishing a viable vegetated feature is the care and maintenance it receives in the first few months after it is plant ed. Once established, all vegetated BMPs require some basic maintenance to insure the health of the plants including:

- *Pest Management*. An Integrated Pest Management (IPM) Plan should be developed for vegetated areas. This plan should specify how problem insects and weeds will be controlled with minimal or no use of insecticides and herbicides.
- *Seasonal Mowing and Lawn Care*. If the filter strip is made up of turf grass, it should be mowed as needed to limit vegetation height to 18 inches, using a mulching mower (or removal of clippings). If native grasses are used, the filter may require less frequent mowing, but a minimum of twice annually. Grass clippings and brush debris should not be deposited on vegetated filter strip areas. Regular mowing should also include weed control practices, however herbicide use should be kept to a minimum (Urbonas et al., 1992). Healthy grass can be maintained without using fertilizers because runoff usually contains sufficient nutrients. Irrigation of the site can help assure a dense and healthy vegetative cover.
- *Inspection*. Inspect filter strips at least twice annually for erosion or damage to vegetation; however, additional inspection after periods of heavy runoff is most desirable. The strip should be checked for uniformity of grass cover, debris and litter, and areas of sediment accumulation. More frequent inspections of the grass cover during the first few years after establishment will help to determine if any problems are developing, and to plan for long-term restorative maintenance needs. Bare spots and areas of erosion identified during semi-annual inspections must be replanted and 3-92 restored to meet specifications. Construction of a level spreader device may be necessary to reestablish shallow overland flow.
- *Debris and Litter Removal*. Trash tends to accumulate in vegetated areas, particularly along highways. Any filter strip structures (i.e. level spreaders) should be kept free of obstructions to reduce floatables being flushed downstream, and for aesthetic reasons. The need for this practice is determined through periodic inspection, but should be performed no less than 4 times per year.
- *Sediment Removal*. Sediment removal is not normally required in filter strips, since the vegetation normally grows through it and binds it to the soil. However, sediment may accumulate along the upstream boundary of the strip preventing uniform overland flow. Excess sediment should be removed by hand or with flat-bottomed shovels.

- *Grass Reseeding and Mulching*. A healthy dense grass should be maintained on the filter strip. If areas are eroded, they should be filled, compacted, and reseeded so that the final grade is level. Grass damaged during the sediment removal process should be promptly replaced using the same seed mix used during filter strip establishment. If possible, flow should be diverted from the damaged areas until the grass is firmly established. Bare spots and areas of erosion identified during semi-annual inspections must be replanted and restored to meet specifications. Corrective maintenance, such as weeding or replanting should be done more frequently in the first two to three years after installation to ensure stabilization. Dense vegetation may require irrigation immediately after planting, and during particularly dry periods, particularly as the vegetation is initially established.

Vegetative Strips in Project Site

Responsible Party:	Comal County Emergency Services District No. 3
Title:	Owner/Operator
Mailing Address:	PO Box 2140
City, State, Zip Code:	Canyon Lake, TX 78133
Telephone:	(830) 907-2922
Name:	Susan Shirley-Menzel
Signature:	Susan Shirley Menzel Comal County ESD No. 3 Commissioner

Texas Department of Transportation
4615 NW Loop 410| San Antonio, TEXAS 78229 0928 | (210) 615-1110 | WWW.TXDOT.GOV

Letter of Intent
For Work In TxDOT Right Of Way Requiring An Edwards Aquifer Protection Plan

The purpose of this letter is to provide the Texas Commission On Environmental Quality (TCEQ) acknowledgement that TxDOT will be allowing work to occur in TxDOT right of way (ROW) that would require an Edwards Aquifer Protection Plan (EAPP), where the applicant of the EAPP is Comal County Emergency Service District No. 3.

Furthermore, by signing this letter, Comal County Emergency Service District certifies that all permanent Best Management Practices (BMP's) required to treat the proposed new impervious cover within TxDOT ROW would be constructed entirely on Comal County Emergency Service District No. 3 property and outside of TxDOT right of way.

The work to be performed in TxDOT ROW is part of a larger plan of development by the Permittee, and is not part of a TxDOT roadway project.

Note that this is not an approval from TxDOT for work to proceed to construction. No construction shall begin until all of the following have occurred:

- TxDOT has been provided a copy of the Permittee's TCEQ Authorization Letter
- An Access Permit has been issued

Signatures:

Permittee Alan R. Stahlman — 8-9-2019 Date

TxDOT Area Engineer/District Maintenance Engineer — 8-9-19 Date

7. Agent Authorization Form (TCEQ-0599)

Agent Authorization Form
For Required Signature
Edwards Aquifer Protection Program
Relating to 30 TAC Chapter 213
Effective June 1, 1999

I Alan Stahlman,
Print Name

Commissioner,
Title - Owner/President/Other

of Comal County Emergency Services District No. 3;
Corporation/Partnership/Entity Name

have authorized CARLOS PACAS
Print Name of Agent/Engineer

of DAWSON VAN ORDEN, INC. (DVO)
Print Name of Firm

to represent and act on the behalf of the above named Corporation, Partnership, or Entity for the purpose of preparing and submitting this plan application to the Texas Commission on Environmental Quality (TCEQ) for the review and approval consideration of regulated activities.

I also understand that:

1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to $10,000 per day per violation.

2. For those submitting an application who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.

3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.

4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.

5. No person shall commence any regulated activity on the Edwards Aquifer Recharge Zone, Contributing Zone or Transition Zone until the appropriate application for the activity has been filed with and approved by the Executive Director.

SIGNATURE PAGE:

Applicant's Signature

6-17-2019
Date

THE STATE OF Texas §

County of Comal §

BEFORE ME, the undersigned authority, on this day personally appeared Alan Stahlman known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that (s)he executed same for the purpose and consideration therein expressed.

GIVEN under my hand and seal of office on this 17th day of June, 2019.

ANGELA FRANCENE HEMPHILL
NOTARY PUBLIC
STATE OF TEXAS
ID# 128345637
EXPIRES 8-2-2022

NOTARY PUBLIC

Angela Hemphill
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 8/2/22

8. Application Fee Form

(TCEQ-0574)

Application Fee Form

Texas Commission on Environmental Quality

Name of Proposed Regulated Entity: Comal County ESD No. 3 Fire Station 54

Regulated Entity Location: 8685 FM 306, New Braunfels, TX 78132

Name of Customer: Comal County Emergency Services District No. 3

Contact Person: Angela Hemphill Phone: (830) 907-2922

Customer Reference Number (if issued):CN CN605676402

Regulated Entity Reference Number (if issued):RN RN110810272

Austin Regional Office (3373)

☐ Hays ☐ Travis ☐ Williamson

San Antonio Regional Office (3362)

☐ Bexar ☐ Medina ☐ Uvalde

☒ Comal ☐ Kinney

Application fees must be paid by check, certified check, or money order, payable to the **Texas Commission on Environmental Quality**. Your canceled check will serve as your receipt. **This form must be submitted with your fee payment**. This payment is being submitted to:

☐ Austin Regional Office

☐ Mailed to: TCEQ - Cashier
Revenues Section
Mail Code 214
P.O. Box 13088
Austin, TX 78711-3088

☒ San Antonio Regional Office

☐ Overnight Delivery to: TCEQ - Cashier
12100 Park 35 Circle
Building A, 3rd Floor
Austin, TX 78753
(512)239-0357

Site Location (Check All That Apply):

☒ Recharge Zone ☐ Contributing Zone ☐ Transition Zone

Type of Plan	*Size*	*Fee Due*
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	5.01 Acres	$ 5000
Sewage Collection System	L.F.	$
Lift Stations without sewer lines	Acres	$
Underground or Aboveground Storage Tank Facility	Tanks	$
Piping System(s)(only)	Each	$
Exception	Each	$
Extension of Time	Each	$

Signature: _____ Date: 07/16/19

TCEQ-0574 (Rev. 02-24-15)

Application Fee Schedule

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program 30 TAC Chapter 213 (effective 05/01/2008)

Water Pollution Abatement Plans and Modifications

Contributing Zone Plans and Modifications

Project	*Project Area in Acres*	*Fee*
One Single Family Residential Dwelling	< 5	$650
Multiple Single Family Residential and Parks	< 5 5 < 10 10 < 40 40 < 100 100 < 500 ≥ 500	$1,500 $3,000 $4,000 $6,500 $8,000 $10,000
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	< 1 1 < 5 5 < 10 10 < 40 40 < 100 ≥ 100	$3,000 $4,000 $5,000 $6,500 $8,000 $10,000

Organized Sewage Collection Systems and Modifications

Project	*Cost per Linear Foot*	*Minimum Fee-Maximum Fee*
Sewage Collection Systems	$0.50	$650 - $6,500

Underground and Aboveground Storage Tank System Facility Plans and Modifications

Project	*Cost per Tank or Piping System*	*Minimum Fee-Maximum Fee*
Underground and Aboveground Storage Tank Facility	$650	$650 - $6,500

Exception Requests

Project	*Fee*
Exception Request	$500

Extension of Time Requests

Project	*Fee*
Extension of Time Request	$150

9. Core Data Form

(TCEQ-10400)

TCEQ Core Data Form

TCEQ Use Only

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided.)*

[X] New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.*)

[ ] Renewal *(Core Data Form should be submitted with the renewal form)* [ ] Other

2. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	3. Regulated Entity Reference Number *(if issued)*
CN 605676402		RN 110810272

SECTION II: Customer Information

4. General Customer Information | **5. Effective Date for Customer Information Updates** (mm/dd/yyyy)

[X] New Customer [ ] Update to Customer Information [ ] Change in Regulated Entity Ownership
[ ] Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).

6. Customer Legal Name *(If an individual, print last name first: eg: Doe, John)* *If new Customer, enter previous Customer below:*

Comal County Emergency Services District No 3

7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number *(if applicable)*
	17426145987	77-0650706	829823207

11. Type of Customer: [ ] Corporation [ ] Individual Partnership: [ ] General [ ] Limited
Government: [ ] City [ ] County [ ] Federal [X] State [ ] Other [ ] Sole Proprietorship [ ] Other:

12. Number of Employees
[ ] 0-20 [X] 21-100 [ ] 101-250 [ ] 251-500 [ ] 501 and higher

13. Independently Owned and Operated?
[X] Yes [ ] No

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following:*

[ ] Owner [ ] Operator [X] Owner & Operator
[ ] Occupational Licensee [ ] Responsible Party [ ] Voluntary Cleanup Applicant [ ] Other:

15. Mailing Address: PO Box 2140

City	State	ZIP	ZIP + 4
Canyon Lake	TX	78133	

16. Country Mailing Information *(if outside USA)*	17. E-Mail Address *(if applicable)*
	angela.hemphill@ccesd3.org

18. Telephone Number	19. Extension or Code	20. Fax Number *(if applicable)*
(830)907- 2922	304	(830)907- 2923

SECTION III: Regulated Entity Information

21. General Regulated Entity Information *(If 'New Regulated Entity" is selected below this form should be accompanied by a permit application)*

[X] New Regulated Entity [ ] Update to Regulated Entity Name [ ] Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC.)

22. Regulated Entity Name *(Enter name of the site where the regulated action is taking place.)*

Comal County ESD No. 3 Fire Station 54

23. Street Address of the Regulated Entity: *(No PO Boxes)*	8685 FM 306						
	City: New Braunfels	State: TX	ZIP: 78132	ZIP + 4:			
24. County	Comal						

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:					
26. Nearest City			State: Texas	Nearest ZIP Code: 78132	
Canyon Lake					
27. Latitude (N) In Decimal:	29.84139		28. Longitude (W) In Decimal:	98.11861	
Degrees: 29	Minutes: 50	Seconds: 29	Degrees: 98	Minutes: 7	Seconds: 7

29. Primary SIC Code (4 digits)	30. Secondary SIC Code (4 digits)	31. Primary NAICS Code (5 or 6 digits)	32. Secondary NAICS Code (5 or 6 digits)
9224	1542	922160	236220

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

Fire Station

34. Mailing Address:	8685 FM 306						
	City: New Braunfels	State: Texas	ZIP: 78132	ZIP + 4:			
35. E-Mail Address:	angela.hemphill@ccesd3.org						

36. Telephone Number	37. Extension or Code	38. Fax Number *(if applicable)*
(830)907-2922	304	(830)907-2923

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☒ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Carlos Pacas	41. Title:	Civil E.I.T

42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(281)293-7500		( ) -	cpacas@dvoeng.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:	Dawson Van Orden, Inc.	Job Title:	Civil E.I.T.
Name *(In Print)* :	Carlos Pacas	Phone:	(281)293-7500
Signature:		Date:	07/10/19